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SDB 60th Annual Meeting

University of Washington, Seattle, Washington

July 18–22, 2001

President—Brigid Hogan

Local Organizing Committee—David Kimelman, Celeste Berg, Billie Swalla, and Philippe Soriano

Program

Numbers in ***italics*** indicate Program Abstract number.

WEDNESDAY—July 18

1:00–5:00 PM Meeting registration at the dorms (Haggett)
5:00–7:00 PM Dinner (McMahon)

Presidential Symposium Analysis of Complex Systems

7:00–9:00 PM HUB Ballroom

Chair: Brigid Hogan

7:00 Brigid Hogan (Vanderbilt Medical School)
Introduction

7:05 Linda Buck (Harvard Medical School)
The molecular architecture of odor and pheromone perception

1 7:45 Joanne Chory (Salk Institute)
Steroid hormones in plant development

8:25 Jay Hirsh (University of Virginia)
Bugs on drugs: Fruit flies as a model system for studying cocaine responsiveness

Opening Reception and Setup for Poster Session I

9:00–11:00 PM Upper Husky Den

THURSDAY—July 19

Meeting Registration

8:00–5:00 PM Kane Lobby

Funding Opportunities in Developmental Biology

8:00–9:00 AM Kane 110

0012-1606/01 $35.00

Moderator: Ida Chow (Society for Developmental Biology)
Domestic resources and international collaboration opportunities
Agencies: NSF, NIH, MOD, HFSP

Biotech Tutorial

8:00–9:00 AM TBA

Concurrent Symposia

9:00–12:15 PM (15-min coffee break around 10:30 AM)

Symposium 1 Cell Interactions and Signaling Pathways 1

9:00–12:15 PM Kane 120

Chair: Philippe Soriano

2 9:00 Philippe Soriano (Fred Hutchinson Cancer Research Center)
PDGF signaling in mouse development

3 9:30 Suzanne Mansour (University of Utah)
Fibroblast growth factors in ear development

4 9:45 Mark Krasnow (Stanford Medical School)
Genetic dissection of epithelial branching and oxygen response pathways in Drosophila

5 10:15 Laurel Raftery (Massachusetts General Hospital)
BMP- and Sog-dependent thresholds of Smad activation during Drosophila dorsal–ventral patterning

10:30 Break

10:45 Jeff Wrana (Samuel Lunenfeld Res. Inst., Canada)
Interpreting TGFβ and BMP signals during early development

6 11:15 Dominic Norris (Harvard University)
A nodal allelic series in the mouse

7 11:30 Malcolm Whitman (Harvard Medical School)
Nodal signals to Smads through Cripto-dependent and Cripto-independent mechanisms

8 11:45 Marek Mlodzik (Mount Sinai School of Medicine)
Noncanonical Frizzled signaling and epithelial planar polarity establishment

Symposium 2 Gametes: Formation and Function

9:00–12:15 PM Kane 110

Chair: Celeste Berg

9 9:00 Eleanor Maine (Syracuse University)
Caenorhabditis elegans EGO-1 functions in germline development and RNAi

10 9:30 Erika Matunis (Carnegie Institution of Washington)
Jak STAT signaling controls male germline and somatic stem cell fate in Drosophila

9:45 Daphne Preuss (University of Chicago)
Mating interactions in Arabidopsis—Signaling and species specificity

11 10:15 Uta Wolke (Max Planck Institute, Germany)
Multiple different modes of zebrafish VASA regulation

10:30 Break

12 10:45 Celeste Berg (University of Washington)
Multiple signaling pathways contribute to patterning and morphogenesis of the Drosophila egg

13 11:15 Karen Bennett (University of Missouri–Columbia)
Identifying Caenorhabditis elegans GLH partners by yeast two-hybrid assays

11:30 Chris Wylie (University of Cincinnati)
Germ cells in the early mouse embryo

14 12:00 York Marahrens (UCLA)
Role of transvection in X-inactivation

Symposium 3 Cell Motility and Guidance

9:00–12:15 PM Kane 210

Chair: Lilianna Solnica-Krezel

15 9:00 Jeff Hardin (University of Wisconsin–Madison)
Molecular mechanisms regulating migration and adhesion of epithelial sheets in the Caenorhabditis elegans embryo

16 9:30 Erik Lundquist (University of Kansas–Lawrence)
Differential roles of Rac GTPase in axon pathfinding and cell corpse phagocytosis in Caenorhabditis elegans

17 9:45 Lilianna Solnica-Krezel (Vanderbilt University)
Genetic control of convergent extension movements during zebrafish gastrulation

18 10:15 Gilbert Weidinger (Max Planck Institute, Germany)
Attraction, active migration, and clustering of zebrafish primordial germ cells

10:30 Break

19 10:45 Pernille Rorth (European Molecular Biology Laboratory, Germany)
Regulation of cell migration during Drosophila oogenesis

20 11:15 Dan Mellott (University of Victoria, Canada)
ephB1 receptor and ephrins guide the migration of avian hindbrain neural crest

21 11:30 Darren Gilmour (Max Planck Institute, Germany)
A neural-crest-derived glial lineage in the zebrafish: Coupling in vivo imaging and genetic analysis

11:45 Peter Devreotes (Johns Hopkins University)
Chemotactic gradient sensing in eukaryotic cells

12:30–1:30 PM **Lunch** (McMahon)

Education Workshop Ethics

1:30–3:30 PM HUB Ballroom

Chair: Karen Crawford

1:30 Mary Claire King (University of Washington)
Genomic views of human history

22 2:00 Anne McLaren (University of Cambridge, UK)
Human embryo and stem cell research: A view from Europe

2:30 Karen Crawford (St. Mary's College of Maryland)—Moderator
Discussion

Poster Session I

1:30–4:00 PM Upper Husky Den

Numbers in ***italics*** indicate the Program Abstract Number.
B numbers indicate the poster Board number.
Odd number boards: Authors present at posters 1:30–3:00 PM
Even number boards: Authors present at posters 9:00–10:30 PM

Cell Biology of Development

23 B1 The developmental biology of conjugation in *Tetrahymena*, a ciliated protist. E.S. Cole, K.R. Stuart, M. Virtue, and E. Zweifel. St. Olaf Col., Northfield, MN.

24 B2 The dynamic cell wall of *Acetabularia*. E. Dunn, R. Froisland, M.E. Moffet, S. Mehri, N. Carpita, X. Huang, R. Kline, A. Mackay, M. Madison, I. Taylor, Z. Yang, G. Odell, and D. Mandoli. Univ. of Washington, Seattle, WA; Purdue Univ., W. Lafayette, IN; Univ. of British Columbia, Canada; and Univ. of California, Riverside, CA.

25 B3 Morpholino antisense-mediated depletion of SpRunt-1 causes mitotic abnormalities and late-cleavage-stage arrest in sea urchin embryos. J.A. Coffman, S.J. Morris, and C.W. Thurm. Stowers Inst. for Med. Res., Kansas City, MO.

26 B4 Incorporation of wheat germ agglutinin into the calcitic spicule of developing sea urchin embryos. N.M. Mozingo. Miami Univ., Oxford, OH.

27 B5 The role of the cytoskeleton during cytoplasmic cap formation and early cleavage in the squid, *Loligo pealei*. K. Crawford. St. Mary's Col. of Maryland, St. Mary's City, MD.

28 B6 A germline clone screen identifies a new gene involved in cytoskeleton organisation and mRNA localisation. S.G. Martin and D. St Johnston. Wellcome/CRC Inst., Cambridge, UK.

29 B7 *Gurken*- and microtubule-independent polarization of the *Drosophila* oocyte: *rab11*-mediated organization of the posterior pole. G.L. Dollar, E. Struckhoff, J. Michaud, and R.S. Cohen. Univ. of Kansas, Lawrence, KS.

30 B8 Conserved signals and machinery for asymmetric RNA localisation in *Drosophila* oocytes and embryos. S.L. Bullock and D. Ish-Horowicz. Imperial Cancer Res. Fund, London, UK.

31 B9 Cytoskeleton networks affect Cdk1–cyclin B activities in the syncytial *Drosophila* embryo. J.Y. Ji, C. Trusty, C. Beach, and G. Schubiger. Univ. of Washington, Seattle, WA.

32 B10 Rho1 is required for localization of adherens junction components during *Drosophila* development. C.R. Magie, D. Pinto-Santini, and S.M. Parkhurst. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

33 B11 Characterization of a novel dominant allele of the roughest-irregular chiasm C gene shows its requirement for pigment cell fate determination in the *Drosophila* retina. S. Octacílio-Silva, H. Araújo, L.C.H. Machado, and R.G.P. Ramos. Ribeirão Preto Med. Sch., São Paulo, Brazil.

34 B12 Steroid regulation of programmed cell death during *Drosophila* development. C.-Y. Lee, C.R. Simon, and E.H. Baehrecke. Univ. of Maryland, College Park, MD.

35 B13 Transcription factors E75 and MHR3 display a mosaic response to rising titers of ecdysone in *Manduca* epidermis. R.E. Langelan, K. Hiruma, and L.M. Riddiford. Univ. of Washington, Seattle, WA.

36 B14 Spindle rotation in the early *Caenorhabditis elegans* embryo. A.J. Wright and C.P. Hunter. Harvard Univ., Cambridge, MA.

37 B15 Unraveling the role of calcium signaling in the early embryo. J.M. Squirrell, J. Ji, J.W. Walker, and J.G. White. Univ. of Wisconsin, Madison, WI; and Univ. of Washington, Seattle, WA.

38 B16 Cell cycle control during *Xenopus tropicalis* oocyte maturation. J-F. Bodart, D. Gutierrez, and N. Duesbery. Van Andel Res. Inst., Grand Rapids, MI.

39 B17 Effects of localized actomyosin contraction in *Xenopus laevis* oocytes. J. Thorn and B. Kay. Knox Col., Galesburg, IL; and Univ. of Wisconsin, Madison, WI.

40 B18 Segregation of zebrafish muscle lineages: Lineage relationships and cellular commitment. E. Hirsinger and M. Westerfield. Univ. of Oregon, Eugene, OR.

41 B19 When and where do zebrafish slow muscle precursors stop dividing? J.A. D'Angelo, M.J.F. Barresi, and S.H. Devoto. Wesleyan Univ., Middletown, CT.

42 B20 How your muscles know you've been working out: The IP_3 pathway as a developmental signal in skeletal muscle. J.A. Powell, M.A. Carrasco, D.S. Adams, B. Drouet, J. Rios, M. Muller, M. Estrada, and E. Jaimovich. Smith Col., Northampton, MA; Univ. of Chile, Santiago, Chile; and INSERM U-505, Paris, France.

43 B21 Bone morphogenetic protein (BMP) function is required for the initial myofibrillogenesis in chick cardiogenesis. Y. Nakajima, T. Yamagishi, and H. Nakamura. Saitama Med. Sch., Saitama, Japan.

44 B22 The zebrafish inv gene is required for left–right brain and heart development. J.J. Essner, X.-H. Wang, J. Zhang, and H.J. Yost. Univ. of Utah, Salt Lake City, UT.

45 B23 Fates of neural crest cells in zebrafish Waardenburg–Shah model *colorless/sox10* mutant. K.A. Dutton and R.N. Kelsh. Univ. of Bath, Bath, UK.

46 B24 Zebrafish *mosaic eyes* gene is required for tight junction formation in the retinal pigmented epithelium. A.M. Jensen and M. Westerfield. Univ. of Oregon, Eugene, OR.

47 B25 BMP11—A candidate negative regulator of olfactory neurogenesis. H.-H. Wu, P. Chern, J.E. Johnson, and A.L. Calof. Univ. of California, Irvine, CA; and Univ. of Texas Southwestern, Dallas, TX.

48 B26 Insulin-like growth factor-II modifies cell survival and proliferation during a discrete period of mouse embryogenesis. J.L. Burns and A.B. Hassan. Univ. of Oxford, Oxford, UK.

49 B27 Immunohistochemical localization of leukemia inhibitory factor, interleukins 1α and 1β and IL-6 in embryo–endometrium interface during implantation in the rhesus monkey. L. Dhawan, D. Ghosh, and J. Sengupta. All India Inst. of Med. Sci., New Delhi, India.

50 B28 Exposure of human ES cells to TGF β family members alters endoderm and mesoderm differentiation *in vitro.* M.T. Firpo, C. Ayala, C. Catuar, J.J. Meneses, G. Perez, and R.A. Pedersen. Univ. of California, San Francisco, CA.

Cell Interactions

51 B29 The role of callose in root gravitropism. L.C. Enns, R.E. Cleland, K.U. Torii, and L. Comai. Univ. of Washington, Seattle, WA.

52 B30 Peripodial membrane cells regulate imaginal disc development in *Drosophila*. M.C. Gibson and G. Schubiger. Univ. of Washington, Seattle, WA.

53 B31 Functional characterization of the Lim1 gene during gastrulation. N.A. Hukriede, D.L. Weeks, and I.B. Dawid. NICHD, NIH, Bethesda, MD; and Univ. of Iowa, Iowa City, IA.

54 B32 Early pregnancy factor in embryonic development and during pregnancy in the dasyurid marsupial, *Sminthopsis macroura* (*Spencer*). Y.P. Cruz, L. Selwood, H. Morton, and A.C. Cavanagh. Oberlin Col., Oberlin, OH; Univ. of Melbourne, Melbourne, Australia; and Univ. of Queensland, Brisbane, Australia.

55 B33 Survey of surface characteristics of human cancer cells using derivatized agarose beads. G.R. Weerasinghe, M.R. Khurrum, E.S. Soriano, O. Badali, T. Sakhakorn, L. Kirszenbaum, L. Ngo, K. Abedi, C. Harieg, V.M. Navarro, M. Barajas, A. Martino, D. Toledo, J. Ching, M.W. Soccar, D. Khatibi, R. Riman, C.A. Bulan, G. Zem, K.M. Cork, S. Meshkinfam, R. Nejathaim and S.B. Oppenheimer. California State Univ., Northridge, CA.

Cell Motility and Guidance

56 B34 Filopodial initiation and a novel filament organizing center, the focal ring. K.W. Tosney, K. Balazovich, and M. Steketee. Univ. of Michigan, Ann Arbor, MI.

57 B35 Morphogenetic domains and their ontogeny in the zebrafish gastrula. M.S. Cooper and L.A. D'Amico. Univ. of Washington, Seattle, WA.

58 B36 *Stuck in place* is a new locus required for proper cell migration in *Drosophila*. J.A. McDonald and D.J. Montell. Johns Hopkins Univ. Sch. of Med., Baltimore, MD.

59 B37 Identification of genes controlling longitudinal guidance in the nematode *Caenorhabditis elegans*. A. Adeleye, F. Vedulla, and E. Stringham. Trinity Western Univ., Langley, Canada.

60 B38 The regulation of bud elongation and branching program initiation during lacrimal gland development. H. Makarenkova and R. Lang. Skirball Inst., NYU Sch. of Med., New York, NY.

61 B39 Hindbrain neural crest cells require integrins for epithelial–mesenchyme transition, but not for pathfinding. R.L. Atkins, D. Wang, and R.D. Burke. Univ. of Victoria, Victoria, Canada.

62 B40 Avian neural crest migration guidance, from micrometers to millimeters. A.J. Ewald and S.E. Fraser. Caltech, Pasadena, CA.

63 B41 Quantitative analysis of germ cell movements in tissue explants. K.A. Molyneaux, K. Schaible, and C. Wylie. Children's Hosp., Cincinnati, OH.

64 B42 Regulation of Doublecortin, a protein implicated in cortical neuron migration. B.T. Schaar, K. Kinoshita, A. Hyman, and S.K. McConnell. Stanford Univ., Stanford, CA; and Max Planck Inst. of Mol. Cell Biol. and Genet., Dresden, Germany.

Body Plan

65 B43 Embryonic handedness choice in *Caenorhabditis elegans* involves a Gα protein encoded by the *spn-1* gene. W.B. Wood, B. Robertson and D. Bergmann. Univ. of Colorado, Boulder, CO.

66 B44 Spatial expression patterns of *Hox* genes during development of the sepiolid squid, *Euprymna scolopes*. P.N. Lee, P. Callaerts, B. Hartmann, D. Choy, M.Q. Martindale, and H.G. de Couet. Univ. of Hawaii at Manoa, Honolulu, HI.

67 B45 A sensitized haploid screen for zebrafish gastrulation mutants. D.H. Lee, F.A. Olale, T. Bruno, D. Yelon, and A.F. Schier. Skirball Inst., NYU Sch. of Med., New York, NY.

68 B46 Pitx2c-gfp trangenic zebrafish identify regions of asymmetric gene expression in the central nervous system. H.J. Yost, E.B. Harris, and J.J. Essner. Univ. of Utah, Salt Lake City, UT.

69 B47 Arkadia is essential for specification of anteroposterior and left–right axes. P.M. Timmons, R.L. Andrew, J.J. Walsh, D. Swan, R. Arkell, and V. Episkopou. MRC Clin. Sci. Ctr., London, UK.

70 B48 The isolation and characterisation of novel genes involved in patterning of the early mouse embryo. R. Kettleborough, A. Rana, R. Nunes, S. Dunwoodie, J. Brickman, and R.S.P. Beddington. NIMR, London, UK.

71 B49 Inadequate differentiation of endoderm/mesoderm derived cells in mouse *l7Rn3* mutant embryos. H. Nakamura, S.E. Thomas, and M.J. Justice. Baylor Col. of Med., Houston, TX.

72 B50 Functional analyses of bone morphogenetic proteins during pattern formation and organogenesis in mouse embryos. Y. Mishina, C. Trisha, and S. Kishigami. Natl. Inst. of Envrn. Hlth. Sci., NIH, Res. Triangle Park, NC.

73 B51 Evidence that delta and forkhead genes interact during somitogenesis in the mouse. B. Wilm and B.L.M. Hogan. Vanderbilt Univ. Sch. of Med., Nashville, TN.

74 B52 The role of midline *FGF8* in left–right axis specification in the rabbit. M. Blum and A. Fischer. Forschungszentrum Karlsruhe, Karlsruhe, Germany.

Morphogenesis

75 B53 Complete live *Drosophila* embryogenesis: time-lapse movie of histone–GFP embryos with multiphoton microscopy. J.Y. Ji, J. Squirrell, D. Hurley, and G. Schubiger. Univ. of Washington, Seattle, WA; and Univ. of Wisconsin, Madison, WI.

76 B54 Genetic analysis of isometric growth in the zebrafish. M.K. Iovine and S.L. Johnson. Washington Univ. Sch. of Med., St. Louis, MO.

77 B55 Growth control in the zebrafish, *Danio Rerio.* M.I. Goldsmith, R. Waterman, and S.L. Johnson. Washington Univ. Sch. of Med., St. Louis, MO.

78 B56 Zebrafish Paxillin and FAK are necessary for normal development. C.A. Henry, B.D. Crawford, and M.B. Hille. Univ. of Washington, Seattle, WA.

79 B57 *One-eyed pinhead*-dependent cell behavior in the zebrafish blastula. R.M. Warga and D.A. Kane. Univ. of Rochester, Rochester, NY.

80 B58 A relationship of epiboly with other cellular movements in the zebrafish gastrula. D.A. Kane, K.N. DelKanic, and R.M. Warga. Univ. of Rochester, Rochester, NY.

81 B59 Cell internalization during zebrafish gastrulation. A.J. Carmany-Rampey and A.F. Schier. Skirball Inst., NYU Sch. of Med., New York, NY.

82 B60 3D time-lapse analysis of *Xenopus* gastrulation movements using μMRI. C. Papan, S.S. Velan, S.E. Fraser, and R.E. Jacobs. Beckman Inst., California Inst. of Technol., Pasadena, CA.

83 B61 The role of the Rho GTPases in controlling cell movements: A close look into the fine mechanics of *Xenopus* gastrulation. E. Tahinci and K. Symes. Boston Univ. Sch. of Med., Boston, MA.

84 B62 Involvement of PAR-6 in the regulation of gastrulation cell movement in *Xenopus* early development. S-C. Choi and J-K. Han. Pohang Univ. of Sci. and Technol., Pohang, Republic of Korea.

85 B63 Migration and mechanics during closure of the mesendodermal mantle in *Xenopus laevis*. L.A. Davidson, R. Keller, and D.W. DeSimone. Univ. of Virginia Hlth. Syst., Sch. of Med., Charlottesville, VA.

86 B64 Cell autonomous effect of the Wnt pathway in Spemann organizer formation in *Xenopus laevis*. A. Vonica and B.M. Gumbiner. Sloan-Kettering Inst., New York, NY.

87 B65 Identifying neurulation genes in chick. J-F. Colas and G.C. Schoenwolf. Univ. of Utah Sch. of Med., Salt Lake City, UT.

88 B66 Exploring a genetic basis for neurulation in zebrafish. R.M. Brewster, A.L. Rubinstein, and M.E. Halpern. Carnegie Inst. of Washington, Baltimore, MD.

89 B67 A role for midline signaling in neural convergence and extension. C.M. Scott-Whitlow, C.R. Heitz, and R.E. Keller. Univ. of Virginia, Charlottesville, VA.

90 B68 The role of the AP-2α transcription factor in ventral body wall closure. S.L. Brewer, S. Donaldson, and T. Williams. Yale Univ., New Haven, CT; and Univ. of Colorado Hlth. Sci. Ctr., Denver, CO.

91 B69 Epithelial–mesenchymal transition and neural crest differentiation: Several routes to one outcome. D.F. Newgreen, S. Lewis, and J. Minichiello. Murdoch Childrens Res. Inst., Parkville, Australia.

92 B70 Neural crest cell motility in valproic acid. D. Wiens, L. Fuller, and S. Cornelius. Univ. of Northern Iowa, Cedar Falls, IA.

93 B71 Genetic dissection of c-*kit* function during embryonic melanocyte development in the zebrafish. J.F. Rawls and S.L. Johnson. Washington Univ. Sch. of Med., St. Louis, MO.

94 B72 The *flat top* mutation affects the differentiation of postotic neural crest. T.H. Linbo, C.B. Moens, and D.W. Raible. Univ. of Washington, Seattle, WA; and Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

95 B73 Time-lapse analysis of somite formation in whole chick embryo explants. P.M. Kulesa and S.E. Fraser. California Inst. of Technol., Pasadena, CA.

96 B74 Contribution of somitic cells to the avian axial skeleton and hypaxial musculature. D.J.R.Evans. Cardiff Univ., Cardiff, Wales, UK.

97 B75 Dorsal, axial morphogenesis; deposition of the ECM protein fibrillin; and sonic hedgehog expression are all dependent on the notochord–somite boundary. P. Skoglund, A. Rolo, and R.E. Keller. Univ. of Virginia, Charlottesville, VA.

98 B76 The upstream ectoderm enhancer in Pax6 has an important role in lens induction. P.V. Dimanlig and R.A. Lang. Skirball Inst. for Biomolec. Med., New York Univ. Sch. of Med., New York, NY.

99 B77 Chondrogenesis of the otic capsule during the chicken inner ear development. W. Chang, P. ten Dijke, and D.K. Wu. NIDCD/NIH, Rockville, MD; and The Netherlands Cancer Inst., Amsterdam, The Netherlands.

100 B78 Mechanisms of left–right asymmetric digestive organ morphogenesis. J.L. Keene, D.R. Knutson, and N.M. Nascone-Yoder. Eckerd Col., St. Petersburg, FL.

101 B79 The Ret signaling system and pronephric duct migration in axolotl and *Xenopus* embryos. J. Drawbridge, M.E. Kite, C.M. Meighan, and R. Lumpkins. Rider Univ., Lawrenceville, NJ.

102 B80 Evidence that SPROUTY2 functions as an inhibitor of mouse embryonic lung growth and morphogenesis. A. Mailleux, D. Tefft, D. Ndiaye, N. Itoh, J-P. Thiery, D. Warburton, and S. Bellusci. CNRS/Institut Curie, Paris, France; Childrens Hosp. Los Angeles Res. Inst., Univ. of Southern California, Los Angeles, CA; and Kyoto Univ., Kyoto, Japan.

103 B81 Absence of ventricular ballooning segments in embryos lacking the homeobox gene Nkx2-5. C. Biben, L. McDonald, and R.P. Harvey. Victor Chang Cardiac Res. Inst., Darlinghurst, Australia.

104 Withdrawn.

105 B83 Characterization of the roles of a novel T-box transcription factor, hrT, during cardiovascular development in zebrafish. D.P. Szeto, K.J.P. Griffin, and D. Kimelman. Univ. of Washington, Seattle, WA.

106 B84 Distinct mechanisms regulate slow muscle development during the embryonic and larval periods. M.J.F. Barresi, J.A. D'Angelo, L.P. Hernandez, and S.H. Devoto. Wesleyan Univ., Middletown, CT.

107 B85 A new semidominant mutation linked to Shh causes preaxial polydactyly. J.O. Bush and R.J. Jiang. Univ. of Rochester Sch. of Med. and Dent., Rochester, NY.

108 B86 *Engrailed1* is critical for repression of nail-type differentiation in mouse. P. Kraus, C. Tong, and C.A. Loomis. NYU Sch. of Med., New York, NY.

109 B87 Surprising expression pattern of cholesterogenic enzymes during embryonic mouse development. D. Laubner, R. Breitling, and J. Adamski. GSF, Natl. Res. Ctr., Neuherberg, Germany.

110 B88 DWnt-4 cooperates with Dfrizzled-2 to regulate cell motility during ovarian morphogenesis. E.D. Cohen and E. Wilder. Univ. of Pennsylvania Sch. of Med., Philadelphia, PA.

111 B89 Genetic screen identifies *Bicaudal-C, Kinesin heavy chain*, and *Shark* as enhancers of *bullwinkle*. D.H. Tran and C.A. Berg. Univ. of Washington, Seattle, WA.

112 B90 Planarian regeneration: A classic problem enters the era of functional genomics. P.A. Newmark, S. Robb, R. Juste, S. Saha, and A. Sanchez Alvarado. Carnegie Inst. of Washington, Baltimore, MD.

113 B91 Pharynx tubulogenesis during *Caenorhabditis elegans* development. M.F. Portereiko and S.E. Mango. Univ. of Utah, Salt Lake City, UT.

114 B92 Development of the *Acetabularia acetabulum* vacuole: A model for vacuolar morphogenesis and inheritance. P.A. Garland, D. Ngo, P. Luethe, and D. Mandoli. Univ. of Washington, Seattle, WA.

115 B93 The *invA* gene of *Volvox* encodes a novel kinesin that is required for inversion of the embryo. I. Nishii and D.L. Kirk. Washington Univ., St. Louis, MO.

Organogenesis

116 B94 Regulation of organ shape in *Arabidopsis* by ERECTA receptor-like kinase. E.D. Shpak, C.A.B. Josefsson, and K.U. Torii. Univ. of Washington, Seattle WA.

117 B95 Specification of organ identity by the *Caenorhabditis elegans* FoxA protein PHA-4. J. Gaudet, M. Horner, S. Kim, and S.E. Mango. Univ. of Utah, Salt Lake City, UT; and Stanford Univ. Med. Sch., Stanford, CA.

118 B96 Molecular integration of signaling activities and tissue-specific transcription factors during visceral mesoderm specification of *Drosophila*. H.H. Lee, S. Zaffran, and M. Frasch. Mount Sinai Sch. of Med., New York, NY.

119 B97 BMP signaling is important for mesoderm specification and regulation of neurectoderm growth in mouse embryonic development. S. Miura, M.D. Tallquist, P. Soriano, and Y. Mishina. NIEHS/NIH, Research Triangle Park, NC; and Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

120 B98 Chick–quail chimerism proves the mesenchymal origin of bursal secretory dendritic cell. N. Nagy, A. Magyar, and I. Olah. Semmelweis Univ., Budapest, Hungary.

121 B99 Tissue-specific knockout of smoothened reveals a critical role for hedgehog signaling in chondrocyte proliferation. F. Long, X. Zhang, and A.P. McMahon. Harvard Univ., Cambridge, MA.

122 B100 Study on the role of epidermal growth factor in chondrogenesis. K.M. Ng, S.E. Cheah, W.C. Wong, and S.Y. Chan. Univ. of Hong Kong, Hong Kong, China; and Univ. of Tokyo, Tokyo, Japan.

123 B101 Commitment and differentiation of avian head muscles. D. Noden, X. Borue, and R. Marcucio. Cornell Univ., Ithaca, NY; and Univ. of California, San Francisco, CA.

124 B102 Evolutionary conservation of Hoxc13. R. Thummel, M.P. Sarras, and A.R. Godwin. Univ. of Kansas Med. Ctr., Kansas City, KS.

125 B103 Rescue of cleft palate in Msx1-deficient mice by transgenic Bmp4 reveals a role of BMP and SHH signaling in mammalian palatogenesis. Z. Zhang, Y. Song, X. Zhao, X. Zhang, and Y. Chen. Tulane Univ., New Orleans, LA.

126 B104 *Wnt* pathway members in the development of hair and other skin appendages. U. Gat, B.J. Merrill, and E. Fuchs. Hebrew Univ., Jerusalem, Israel; and Univ. of Chicago, Chicago, IL.

127 B105 The role of Msx1 and Bmp4 in digit tip regeneration of mice. M. Han and K. Muneoka. Tulane Univ., New Orleans, LA.

128 B106 Genetic analysis of zebrafish fin regeneration. K.D. Poss, A. Nechiporuk, S.L. Johnson, and M.T. Keating. Children's Hosp., Boston, MA; and Washington Univ., St. Louis, MO.

129 B107 A role for the LIM domain cofactors Clim2/Ldb-1/Nli in hair follicle regulation. E.I. Kudryavtseva, I. Chen, T.M. Sugihara, and B. Andersen. UCSD, La Jolla, CA; and UCI, Irvine, CA.

130 B108 Overexpression of a soluble dominant negative FGFR1 and SPRY2 affects craniofacial and feather development. M. Mandler and A. Neubuser. Inst. of Molec. Pathol., Vienna, Austria.

131 B109 *In vitro* studies of the discrete steps in the development of mouse Rathke's pouch. A.S. Gleiberman, E.I. Kudryavtseva, and M.G. Rosenfeld. UCSD, La Jolla, CA.

132 B110 Pitx2 is required at multiple stages of pituitary organogenesis: Formation of the pituitary primoridum and cell specification. H. Suh, P.J. Gage, J. Drouin, and S.A. Camper. Univ. of Michigan, Ann Arbor, MI; and Inst. of Clin. Res., Montreal, Canada.

133 B111 Dorsal–ventral patterning in *Xenopus* inner ear: Ablation and Wnt-3a studies. C.A. Forristall and A. Collazo. Univ. of Redlands, Redlands, CA; and House Ear Inst., Los Angeles, CA.

134 B112 Cell death in the developing avian ear: Caspase activity in hot spot of apoptosis. M.M. Bever and D.M. Fekete. Purdue Univ., W. Lafayette, IN.

465* B112 *Ras1* is required cell autonomously in the *Drosophila* follicular epithelium for *pipe* repression and dorsal follicle cell migration. K.E. James and C.A. Berg. Univ. of Washington, Seattle, WA.
*Poster moved from Poster Session II, B175

135 B113 Using large-scale gene expression screens in the mouse to identify developmental regulators: Applications for the study of vertebrate eye development. C.J. Thut, R.B. Rountree, M. Hwa, and D.M. Kingsley. Stanford Univ., Stanford, CA.

136 B114 The role of Eya genes during mammalian organogenesis. P. Xu, R. Maas, C. Buller, H. Peters, and X. Xu. McLaughlin Res. Inst., Great Falls, MT.

137 B115 FGF receptor and BMP7 signaling cooperate in lens induction. S.C. Faber, H.P. Makarenkova, P. Dimanlig, and R.A. Lang. Skirball Inst. and New York Univ. Med. Ctr., New York, NY.

138 B116 A role for sonic hedgehog in fetal thymus development. B.A. Moore and N.R. Manley. Med. Col. of Georgia, Augusta, GA.

139 B117 ITIH-4, a serine protease inhibitor, plays a prominent functional role in IL-6-induced hepatocyte formation. C. Banumathy, Y. Tang, C. Fox, B. Mishra and L. Mishra. DVAMC, Washington, DC, and Fels Cancer Inst., Temple Univ., Philadelphia, PA; NHGRI, NIH, Bethesda, MD; and Walter Reed Army Med. Ctr., Washington, DC.

140 B118 Expression of Prox1 during liver development. Z.D. Burke, B. Sosa-Pineda, J. Wigle, and G. Oliver. Saint Jude Children's Res. Hosp., Memphis, TN.

141 B119 The roles of FGFs, BMP4, and SHH in transdifferentiation of mouse tracheal epithelium in mesenchyme-free culture. B.A. Hyatt, J.A. Whitsett, and J.M. Shannon. Children's Hosp. Med. Ctr., Cincinnati, OH.

142 B120 Hlx homeobox transcription factor downstream targets identified in *Hlx* knockout mesenchymal cell lines. M.D. Bates, D.A. Persons, L.C. Schatzman, R.P. Harvey, and S.S. Potter. Children's Hosp. Med. Ctr., Cincinnati, OH; St. Jude Children's Res. Hosp., Memphis, TN; and St. Vincent's Hosp., Darlinghurst, Australia.

143 B121 The homeobox gene *Hex* is necessary for liver and lung development. C.W. Bogue, C.M. Wilson, H. Vasavada, and H.C. Jacobs. Yale Univ. Sch. of Med., New Haven, CT.

144 B122 The correct regional specification and function of the stomach requires mesenchymal–epithelial signaling cascades controlled by *Hoxa5*. J. Aubin, U. Déry, P. Chailler, and L. Jeannotte. Univ. Laval, Univ. of Quebec, L'Hotel-Dieu de Quebec, and Univ. of Sherbrooke, Quebec, Canada.

145 B123 Using a novel gut culture system to analyze the influence of known and novel genes on intestinal epithelial differentiation. H.E. Abud, C.N. Johnstone, N. Watson, N.C. Tebbutt, M. Ernst, and J.K. Heath. Ludwig Inst. for Cancer Res., Royal Melbourne Hosp., Melbourne, Australia.

146 B124 A new *Abd-B* class homeobox gene (HgHbox12) from an echinoderm, and its expression during intestinal regeneration. A.T. Mendez-Merced and J.E. Garcia-Arraras. Univ. of Puerto Rico, Rio Piedras, Puerto Rico.

147 B125 Two actin isoforms are differentially expressed during regenerative organogenesis in the echinoderm *Holothuria glaberrima.* J.L. Roig-Lopez, C. Lasalde, and J.E. Garcia-Arraras. Univ. of Puerto Rico–Rio Piedras, San Juan, PR.

148 B126 Notochord and endothelial signals during patterning of the *Xenopus* endoderm. O. Cleaver and D. Melton. Harvard Univ., Cambridge, MA.

149 B127 Gata4 and Gata6 function in the mouse embryonic pancreas. D.C. Goldman and L. Sussel. Univ. of Colorado Hlth. Sci. Ctr., Denver, CO.

150 B128 Cloning and functional characterization of *Xenopus* Pod-1, a bHLH transcription factor expressed in the developing pronephric kidney. S.R. Eid and A.W. Brändli. Swiss Fed. Inst. of Technol., Zurich, Switzerland.

151 B129 The biology of becoming: Cell fate decisions during embryonic kidney development. K.A. McLaughlin, M.S. Rones, and M. Mercola. Harvard Med. Sch., Boston, MA.

152 B130 Differential regulation of pax2 and lim1 in the chick embryonic kidney. R.G. James and T.M. Schultheiss. Beth Israel Deaconness Med. Ctr., Boston, MA.

153 B131 Visualization of kidney branching morphogenesis. T. Watanabe, S. Srinivas, C.S. Lin, R. Shakya, and F. Costantini. Columbia Univ., New York, NY; and Natl. Inst. of Med. Res., London, UK.

154 B132 Regulation of metanephric kidney development by Gdf-11. A. Esquela Kerscher, A. McPherron, and S-J. Lee. Johns Hopkins Sch. of Med., Baltimore, MD.

155 B133 Role of the transcription factors Pax2 and Pax8 in nephric lineage determination. M. Bouchard, A. Souabni, and M. Busslinger. Inst. for Molec. Pathol., Vienna, Austria.

156 B134 The role of Wnts in the development of the kidney collecting ducts. T.J. Carroll, M. Ishibashi, B. Parr, and A.P. McMahon. Harvard Univ., Cambridge, MA.

157 B135 The role of sonic hedgehog during mouse kidney development. J. Yu, T.J. Carroll, P.M. Lewis, and A.P. McMahon. Harvard Univ., Cambridge, MA.

158 B136 Kidney development depends on a novel reciprocal signaling loop mediated by vitamin A and ret. E. Batourina, S. Gim, N. Bello, M. Shy, M. Clagett-Dame, S. Srinivas, F. Costantini, and C. Mendelsohn. Columbia Univ., New York, NY; Univ. of Wisconsin–Madison, Madison, WI; and Natl. Inst. for Med. Res., Mill Hill, London, UK.

159 B137 Functional characterization of the Hey bHLH gene family. M. Gessler, K. Knobeloch, N. Schumacher, K. Amann, N. Golenhofen, and C. Leimeister. Univ. of Wuerzburg, Wuerzburg, Germany; Freie Univ., Berlin, Germany; and Univ. of Erlangen, Erlangen, Germany.

160 B138 A role for XWnt-11 in *Xenopus* cardiogenesis. P. Pandur and M. Kuehl. Univ. of Goettingen, Goettingen, Germany.

161 B139 *In vivo* study of ANF regulation by Nkx2-5 and GATA-4 in transgenic *Xenopus laevis* embryos. E.M. Small and P.A. Krieg. Univ. of Arizona Hlth. Sci. Ctr., Tucson, AZ.

162 B140 Genetic regulation of myocardial differentiation in zebrafish. B.R. Keegan, R.K. Ho, and D.L. Yelon. Skirball Inst. of Biomolec. Med., New York Univ. Med. Ctr., New York, NY; and Princeton Univ., Princeton, NJ.

163 B141 Causes and consequences of an atrium-specific developmental defect in zebrafish. E. Berdougo, D.Y.R. Stainier, and D. Yelon. Skirball Inst., New York Univ. Med. Ctr., New York, NY; and Univ. of California at San Francisco, San Francisco, CA.

164 B142 A role for FGF signaling in the specification of avian heart tissue. T.M. Schultheiss and B.H. Alsan. Beth Israel Deaconess Med. Ctr., Harvard Med. Sch., Boston, MA.

165 B143 *Cardiofunk*, a zebafish mutation disrupting atrioventricular valve formation. T. Bartman and D.Y.R. Stainier. Univ. of California, San Francisco, CA.

166 B144 Bves: Prototype of a new class of cell adhesion molecules expressed during coronary artery development. A.M. Wada, D.E. Reese, and D.M. Bader. Vanderbilt Univ., Nashville, TN.

167 B145 The zebrafish gene *pandora* regulates myocardial differentiation. J.L. Feldman, D.Y.R. Stainier, and D.L. Yelon. Skirball Inst. of Biomolec. Med., New York Univ. Med. Ctr., New York, NY; and Univ. of California, San Francisco, San Francisco, CA.

168 B146 Notch signaling in left–right determination during mouse development. L.T. Krebs, I. Welsh, C.H. Tenney, Y. Lan, R. Jiang, T. O'Brien, and T. Gridley. The Jackson Lab., Bar Harbor, ME.

169 B147 Development of the hematopoietic tissue in the Penaeid shrimp *Sicyonia ingentis*. P.L. Hertzler and O.J. Sepulveda Villet. Central Michigan Univ., Mt. Pleasant, MI.

170 B148 Hedgehog signaling and yolk sac vasculogenesis. N.A. Byrd, S. Becker, P.F. Maye, J.A. McMahon, X.M. Zhang, A.P. McMahon, and L.B. Grabel. Wesleyan Univ., Middletown, CT; and Harvard Univ., Cambridge, MA.

171 B149 Endoderm is not necessary for vascular specification, but is necessary for endothelial tube formation. S.A. Vokes and P.A. Krieg. Univ. of Arizona Hlth. Sci. Ctr., Tucson, AZ.

172 B150 Intersomitic arteries and intersomitic veins form via distinct mechanisms. S. Isogai, N.D. Lawson, S. Torrealday, and B.M. Weinstein. NICHD, NIH, Bethesda, MD.

173 B151 Notch signaling is required for arterial differentiation and repression of venous cell fate during embryonic vascular development. N.D. Lawson, N. Scheer, V.N. Pham, C-H. Kim, A.B. Chitnis, J.A. Campos-Ortega, and B.M. Weinstein. NICHD, NIH, Bethesda, MD; and Univ. of Koln, Cologne, Germany.

174 B152 Competing pathways in testis organogenesis. B. Capel, C. Tilmann, J. Schmahl, J. Brennan, and H.H.C. Yao. Duke Univ. Med. Ctr., Durham, NC.

175 B153 Sex-specific gene expression during mouse gonad development. D. Menke and D.C. Page. MIT, Cambridge, MA.

176 B154 The PDGF α receptor is required for interstitial specification and cord formation in the mammalian testis. C.E. Tilmann, J.R. Brennan, and B. Capel. Duke Univ. Med. Ctr., Durham, NC.

177 B155 The role of FGF9 and proliferation in sex determination. J.P. Schmahl, J. Colvin, D. Ornitz, and B. Capel. Duke Univ., Durham, NC.

178 B156 Direct evidence that *Sry* is expressed in pre-Sertoli cells and that Sertoli and granulosa cells develop from a common precursor. K.H. Albrecht and E.M. Eicher. Jackson Lab., Bar Harbor, ME.

179 B157 Sexually dimorphic vascular development in the XY mouse gonad. J.R. Brennan and B. Capel. Duke Univ. Med. Ctr., Durham, NC.

180 B158 Decisive roles of meiotic germ cells in sex determination of mammalian gonads. H.H.C. Yao and B. Capel. Duke Univ. Med. Ctr., Durham, NC.

181 B159 Assessment of candidate ovarian determining genes. K.A. Loffler, J. Bowles, and P. Koopman. Univ. of Queensland, Brisbane, Australia.

182 B160 Effects of acute nutritional stress during the preimplantation stage of gestation on reproductive functions in the mouse. J.F. Rosario, J. Sengupta, and D. Ghosh. All India Inst. of Med. Sci., New Delhi, India.

183 B161 Effects on teratogenicity by exposure with cyclophosphamide during early organogenic period. S.J. Kwack, H.S. Kim, and K.L. Park. Natl. Inst. of Toxicol. Res., Seoul, Korea.

Gametogenesis and Fertilization

184 B162 POP2, a gene required for guidance of *Arabidopsis* pollen tubes, is similar to class III ω aminotransferases. R. Palanivelu, L.K. Wilhelmi, and D. Preuss. Univ. of Chicago, Chicago, IL.

185 B163 L-HGP, a heterodimeric mucin-like protein with acrosome protective properties. S.E. Arranz, R. Cabrera, and M.O. Cabada. Univ. Nacional de Rosario, Rosario, Argentina.

186 B164 Identification of a sperm lysin in the frog *Lepidobatrachus laevis*. V. Hutchins-Latham and E.J. Carroll, Jr. California State Univ., Northridge, CA.

187 B165 *Xenopus* sperm display three swimming patterns: Ideal corkscrew, uncoupled corkscrew, and idle. S. Naqvi, A. Kittelson, and D.E. Chandler. Arizona State Univ., Tempe, AZ.

188 B166 Allurin, a 21-kDa sperm chemoattractant from *Xenopus* egg jelly, is related to mammalian sperm-binding proteins of the CRISP family. X. Xiang, J. Olson, J. Johnson, A. Rawls, A.L. Bieber, and D.E. Chandler. Arizona State Univ., Tempe, AZ.

189 B167 Isolation of allurin, a 21-kDa sperm chemoattractant protein from *Xenopus laevis* egg jelly: Purification and characterization. J.H. Olson, X. Xiang, T. Ziegert, A. Kittelson, K. Stone, D. Simh, D.E. Chandler, and A.L. Bieber. Arizona State Univ., Tempe, AZ.

190 B168 Identification of a conserved candidate gene for the spermiogenesis defect in the mouse mutant quaking. D. Lorenzetti and M.J. Justice. Baylor Col. of Med., Houston, TX.

191 B169 Sperm nuclear basic proteins in *Drosophila simulans* undergoing Wolbachia-induced cytoplasmic incompatibility. H. Harris and H. Braig. Univ. of Wales, Bangor, United Kingdom.

192 B170 dpo is required in the niche cells to maintain germline stem cells in the *Drosophila* ovary. T. Xie, C. Doan, X. Song, and A. Spradling. Stowers Inst. for Med. Res., Kansas City, MO; and Carnegie Inst. of Washington, Baltimore, MD.

193 B171 Investigating *egalitarian*'s function during *Drosophila* oogenesis. C. Navarro, J.Z. Morris, and R. Lehmann. New York Univ. Med. Ctr., Skirball Inst., New York, NY.

Neural Development

194 B172 Roles of Notch/Abl/Dab and Notch/Su(H) signaling pathways in *Drosophila* axon patterning. M. Le Gall, M. Gates, C. DeMattei, and E. Giniger. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

195 B173 A targeted gain of function screen to identify genes involved in axon guidance in the *Drosophila* CNS. V.L. McGovern and M.A. Seeger. Ohio State Univ., Columbus, OH.

196 B174 Alternate isoforms of Lola regulate the coordinated expression of many networks of axon guidance molecules in *Drosophila*. S. Goeke, E.A. Greene, and E. Giniger. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

197 B175 Getting from here to there: Axon guidance in the periphery. J. Eberhart, M. Swartz, E.B. Pasquale, S.A. Koblar, and C.E. Krull. Univ. of Missouri–Columbia, Columbia, MO; The Burnham Inst., La Jolla, CA; and Univ. of Adelaide, Adelaide, Australia.

198 B176 Pioneer axon guidance errors in Pax6 mutants are rescued by whole mouse embryo electroporation. G.S. Mastick. Univ. of Nevada, Reno, NV.

199 B177 R-cadherin is a Pax6-regulated, growth-promoting cue for pioneer axons. G.L. Andrews and G.M. Mastick. Univ. of Nevada, Reno, NV.

200 B178 What is the role of the growth cone kinase Cdk5 in axon patterning? L. Connell-Crowley, D. Vo, and E. Giniger. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

201 B179 Identifying *Caenorhabditis elegans* UNC-4 targets. S.E. Von Stetina and D.M. Miller III. Vanderbilt Univ., Nashville, TN.

202 B180 *Lox6*, a leech *Dfd* ortholog, may play a role in the patterning of the nervous systems. M.E. Mercado-Pimentel and G.O. Aisemberg. Lehman Col. of CUNY, Bronx, NY.

203 B181 Nerfin-1, a member of the conserved EIN Zn-finger subfamily, is required for proper cell fate specification in the developing *Drosophila* nervous system. A. Kuzin, C. Stivers, T. Brody, and W.F. Odenwald. NINDS, Bethesda, MD.

204 B182 A cDNA screen for *Drosophila* genes that are dynamically expressed during the generation of embryonic neural lineages. T. Brody, C. Stivers, A. Kuzin, and W.F. Odenwald. NINDS, NIH, Bethesda, MD.

205 B183 Timing and competence of neural crest formation. M.L. Basch, M.A.J. Selleck, and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA; and Univ. of Southern California, Sch. of Med., Los Angeles, CA.

206 B184 Underlying mesoderm is not required for neural crest induction. J.W. Ragland and D.W. Raible. Univ. of Washington, Seattle, WA.

207 B185 *Colgate* ^{b382} is required for the normal development of subsets of neural crest cells, primary neurons, and the pectoral fin. R.M. Nambiar and P.D. Henion. Ohio State Univ., Columbus, OH.

208 B186 Survival and glial fate acquisition of neural crest cells are regulated by an interplay between the transcription factor Sox10 and extrinsic combinatorial signaling. L. Sommer, C. Paratore, D.E. Goerich, U. Suter, and M. Wegner. Swiss Fed. Inst. of Technol., Zurich, Switzerland; and Univ. of Erlangen–Nurnberg, Erlangen, Germany.

209 B187 Primary neuronal differentiation and orientated cell division in *Xenopus*. A.D. Chalmers, B. Strauss, and N. Papalopulu. Univ. of Cambridge, Cambridge, UK.

210 B188 Regulation of neurogenesis by Hairy/Enhancer of split-related proteins in *Xenopus laevis*. M. Sölter, T. Hollemann, V. Gawantka, C. Niehrs, E.J. Bellefroid, and T. Pieler. Univ. Gottingen, Gottingen, Germany; Deutsches Krebsforschungszentrum, Heidelberg, Germany; and Univ. Libre de Bruxelles, Gosselies, Belgium.

211 B189 A role for Dlx3 in neural plate border formation. J.M. Woda, J. Pastagia, K.B. Artinger, and M. Mercola. Harvard Med. Sch., Boston, MA.

212 B190 Xrx1 controls neuronal differentiation in the anterior neural plate. M. Andreazzoli, G. Gestri, and G. Barsacchi. Universita' di Pisa, Italy.

213 B191 Notch-mediated fate specification in the zebrafish neural tube. H. Park, A. Mehta, J. Richardson, and B. Appel. Vanderbilt Univ., Nashville, TN.

214 B192 *wimple*, a mouse mutation that plays a role in Shh-dependent neural tube patterning. D. Huangfu and K.V. Anderson. Sloan-Kettering Inst. and Cornell Univ., New York, NY.

215 B193 Neurogenin1 functions as a switch between neuronal and non-neuronal fates in zebrafish lateral neural plate. R.A. Cornell and J.S. Eisen. Univ. of Oregon, Eugene, OR.

216 B194 G protein signaling in the developing zebrafish central nervous system. G.M. Kelly, B. Vanderbeld, and M. Knowlton. Univ. of Western Ontario, London, Canada.

217 B195 A novel gene, axotrophin, is important in neural development. G.E. Lyons, M.A. Haendel, M. Epstein, M. Wagner, and J. Johnson. Univ. of Wisconsin Med. Sch., Madison, WI.

218 B196 Effects of temperature on the gene expression of aromatase and estrogen receptors in the developing tilapia brain. C-L. Tsai. Natl. Sun Yat-sen Univ., Kaohsiung, Taiwan.

219 B197 Regulation of extracellular-matrix-mediated contact inhibition of growth in the developing nervous system. L.S. Sherman, H. Morrison, F. Banine, J. Struve, G. Lepperdinger, T. Tuohy, and C. Kuntz. Univ. of Cincinnati Col. of Med., Cincinnati, OH; and Austrian Acad. of Sci., Inst. of Molec. Biol., Salzburg, Austria.

220 B198 Zfhep transcription factor may influence neural cell differentiation. D.S. Darling, G. Yen, R.T. Zoeller, and R.P. Stearman. Univ. of Louisville, Louisville, KY; and Univ. of Massachusetts, Amherst, MA.

221 B199 Cloning and expression of *Crim1* and its potential function in the development of the central nervous system. G.V. Kolle, A. Jansen, L. Wilkinson, M.H. Little, and T. Yamada. Univ. of Queensland, St. Lucia, Australia.

222 B200 Bone morphogenetic protein (BMP) control of Wnt ligands, secreted inhibitors, and receptors during neural development. C.R. Chesnutt, A.M.C. Brown, and L.A. Niswander. Cornell Univ. and Sloan Kettering Inst., New York, NY.

223 B201 BMP signaling in the mammalian dorsal neural tube. R.W. Stottmann, J. Wiedman, Y. Mishina, and J.A. Klingensmith. Duke Univ. Med. Ctr., Durham, NC; and NIEHS, Res. Triangle Park, NC.

224 Please see Workshop 4: Left–Right Asymmetry

225 B203 The zebrafish *belladonna* mutation specifically affects axon guidance in the ventral forebrain. J. Culverwell, M. Walkowicz, and R. Karlstrom. Univ. of Massachusetts, Amherst, MA.

226 B204 Retinoic acid synthesis for the developing telencephalon. U.C. Drager, D. Smith, E. Wagner, O. Koul, and P. McCaffery. Harvard Med. Sch. and U. Mass. Med. Sch., Waltham, MA.

227 B205 Isolation of a novel paired-like homeobox gene expressed in the midbrain of mouse embryos. A. Ohtoshi and R.R. Behringer. Univ. of Texas M.D. Anderson Cancer Ctr., Houston, TX.

228 B206 A novel function for EphB2 and EphB3 in maintaining cell shape in the developing ventral midbrain. A. Altick, G. Andrews, C. Cowan, N. Yokoyama, M. Henkemeyer, E. Nilsson, and G. Mastick. Univ. of Nevada, Reno, NV.

229 B207 Relevance of TGF-β for the development of ventral midbrain dopaminergic neurons. U. Rauch, L. Farkas, and K. Krieglstein. Univ. of Saarland, Homburg/Saar, Germany.

230 B208 Shh and the isthmus regulate the development of early neurons in the midbrain. N. Fedtsova and E.E. Turner. UCSD, La Jolla, CA; and VA Med. Ctr., San Diego, CA.

231 B209 Lmx1b functions in the zebrafish isthmic organizer. R.D. Riddle, P. O'Hara, and A. Sebastian. Univ. of Pennsylvania Sch. of Med., Philadelphia, PA.

232 B210 Formation of the mesencephalic/metencephalic boundary. M. Zervas, S. Millet, and A. Joyner. Skirball Inst. NYU Med. Ctr., New York, NY.

233 B211 Otx2 and Gbx2 are required to establish, but not induce, expression of genes at the mid-/hindbrain junction. J.Y. Li and A.L. Joyner. HHMI and Skirball Inst., NYU Med. Ctr., New York, NY.

234 B212 Type I BMP receptors are expressed in cerebellar granular neurons and constitutive activation of the IA receptor induces cerebellar abnormalities. J.E. Ming, M. Elkan, K. Tang, and J.A. Golden. Children's Hosp. of Philadelphia and Univ. of Pennsylvania Sch. of Med., Philadelphia, PA.

235 B213 Hedgehog signaling is required for zebrafish motoneuron development. K.E. Lewis and J.S. Eisen. Univ. of Oregon, Eugene OR.

236 B214 Function of zebrafish *gli1* and *gli2* in motor neuron development. A. Chandrasekhar. Univ. of Missouri, Columbia, MO.

237 B215 Hoxb1 coordinates specification of ventral motoneurons and dorsal interneurons at a specific anteroposterior level. G.O. Gaufo and M.R. Capecchi. Univ. of Utah, Salt Lake City, UT.

238 B216 Ectopic expression of Olig1 is deleterious to V3 interneuron development in the developing CNS. T. Sun, R. Lu, C. Stiles, Y. Echelard, and D. Rowitch. Dana-Farber Cancer Inst. and Harvard Med. Sch., Boston, MA.

239 B217 GATA3 identifies a distinct ventral interneuron subtype in the developing spinal cord. A. Karunaratne, M. Hargrave, and T. Yamada. Univ. of Queensland, Brisbane, Australia.

240 B218 Regulation and role of neural bHLH factors in spinal cord development. K. Gowan, A.W. Helms, P. Ebert, T. Hunsaker, T. Collisson, R. Odom, and J.E. Johnson. Univ. of Texas Southwestern Med. Ctr., Dallas, TX.

241 B219 Hoxa5-overexpressing mice have spinal cord defects that impair sensory performance. K.E. Krieger, I.M. Sonea, M. Abbott, and C.K. Tuggle. Iowa State Univ., Ames, IA.

242 B220 Sonic hedgehog (shh) signaling is required for proper development of zebrafish dorsal root ganglia. J.M. Ungos and D.W. Raible. Univ. of Washington, Seattle, WA.

243 B221 A genetic screen to identify zebrafish enteric nervous system mutants. I. Shepherd, T. Linbo, and D. Raible. Univ. of Washington, Seattle, WA.

244 B222 Expression of chick calcium channel γ subunit in differentiating neurons and myoblasts. A. Knecht, B. Kious, and M. Bronner-Fraser. Caltech, Pasadena, CA.

245 B223 Neuronal cell differentiation in the developing mouse brain is influenced by peripheral axonal inputs from sensory and motor neurons. B. Kablar and M.A. Rudnicki. Dalhousie Univ., Halifax, Canada; and Ottawa Hosp. Res. Inst., Ottawa, Canada.

246 B224 Multiple levels of autoregulation on FGF signaling during mouse mid-/hindbrain early patterning. A. Liu and A.L. Joyner. Skirball Inst., New York Univ. Sch. of Med., New York, NY.

247 B225 FGF signaling mediates an organizing activity in the zebrafish hindbrain. L. Maves and C.B. Kimmel. Univ. of Oregon, Eugene, OR.

248 B226 Role of *nlz*, a novel zinc finger protein, in the development of the zebrafish hindbrain. A.P. Runko and C.G. Sagerstrom. Univ. of Massachusetts Med. Ctr., Worcester, MA.

249 B227 Mosaic analysis of antennal lobe projection neurons suggests olfactory system connectivity is genetically predetermined. E.C. Marin, G.S.X.E. Jefferis, R.F. Stocker, and L. Luo. Stanford Univ., Stanford, CA; and Univ. of Fribourg, Pérolles, Switzerland.

250 B228 Development of the avian olfactory placode. S. Bhattacharyya and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA.

251 B229 TGF-β modulates programmed cell death in the developing chick retina. N. Duenker, N. Schuster, and K. Krieglstein. Univ. of Saarland, Homburg/Saar, Germany.

252 B230 The multipotency of retinal progenitor cells depends on Pax6 function. T. Marquardt, R. Ashery-Padan, N. Andrejewski. and P. Gruss. Max-Planck Inst. of Biophys. Chem., Goettingen, Germany.

253 B231 Changes in the sensitivity to apoptosis during development of the retina are associated with Ref-1 expression. L.B. Chiarini, M.L. Leal-Ferreira, F.G. Freitas. and R. Linden. UFRJ, Rio de Janeiro, Brazil.

254 B232 Characterization of retinal differentiation in zebrafish lacking the sonic hedgehog gene. D.M. Mallory, R.A. Frey. and D.L. Stenkamp. Univ. of Idaho, Moscow, ID.

255 B233 The role of math5 during retinal neurogenesis. B.S. Kim, S.W. Wang, W.H. Klein, L. Gan, and R.L. Johnson. Univ. of Texas M. D. Anderson Cancer Ctr., Houston, TX; and Univ. of Rochester, Rochester, NY.

256 B234 IL-1β induces FGF production in the embryonic chick retina. E.I. Barragan, S.A. Avila, V. Chafrat, and J. Cerdeira. Univ. Nacional del Comahue, Toschi and Arrayanes, Cipolletti Rio Negro, Argentina.

257 B235 Localization of components of the retinoic acid (RA) signaling system and effects of RA on photoreceptor patterning in embryonic zebrafish retina. S.N. Prabhudesai and D.L. Stenkamp. Univ. of Idaho, Moscow, ID.

258 B236 Taurine and the glycine receptor in vertebrate retinal development. T.L. Young and C.L. Cepko. Harvard Med. Sch., Boston, MA.

259 B237 Ath5 is required for retinal ganglion cell and optic nerve formation. N.L. Brown, S. Patel, J. Brzezinski, and T. Glaser. Univ. of Michigan, Ann Arbor, MI; and Northwestern Univ. Med. Sch., Chicago, IL.

260 B238 Genetic analysis of neural stem cells in zebrafish retina. A. Wehman and H. Baier. Univ. of California, San Francisco, CA.

3:30–3:45 PM **Break**

Workshops
4:00–5:30 PM

Workshop 1 — Stem Cells
4:00–5:30 PM — HUB Ballroom

Chair: Janet Rossant

261 4:00 Janet Rossant (Samuel Lunenfeld Research Institute, Canada)
Stem cells from the mouse blastocyst

262 4:20 James Sherley (Massachusetts Institute of Technology)
Molecular determinants of asymmetric stem cell kinetics

263 4:40 Melissa Carpenter (Geron Corporation)
Lineage-specific differentiation of human embryonic stem cells

5:00 Discussion

Workshop 2 — Imaging and Cell Marking
4:00–5:30 PM — Kane 120

Chair: Andras Nagy

4:00 Andras Nagy (Samuel Lunenfeld Research Institute, Canada)

264 4:20 Mary Dickinson (Caltech)
Analysis of somite development using a multiphoton, multispectral approach

265 4:40 Steven A. Farber (Thomas Jefferson University)
Visualizing lipid metabolism in live zebrafish

5:00 Discussion

5:30–7:00 PM — Dinner (McMahon)

Plenary Session I — Organ Building
7:00–9:00 PM — HUB Ballroom

Chair: Cliff Tabin

7:00 Cliff Tabin (Harvard Medical School)
Patterning the chick embryo

266 7:30 Bruce Morgan (Massachusetts General Hospital)
Inductive signals that initiate feather bud development

267 8:00 Charles Gasser (UC Davis)
Genetic analysis of ovule morphogenesis

268 8:30 Didier Stainier (UC San Francisco)
Novel role for glycosaminoglycans in cell signaling events during heart valve initiation: Cloning of the zebrafish jekyll

Poster Session I and Mixer Upper
9:00–11:00 PM Husky Den

Odd number boards: Authors present at posters 1:30–3:00 PM
Even number boards: Authors present at posters 9:00–10:30 PM

FRIDAY—July 20

Meeting Registration
8:00–5:00 PM Kane Lobby

Discussion on SDB's Moratorium on Cloning of Human Being
8:00–9:00 AM Kane 110

Moderator: Roger Pedersen (UC San Francisco)

Biotech/Imaging Tutorials
8:00–9:00 AM TBA

Setup for Poster Session II
8:00–1:00 PM Upper Husky Den

Concurrent Symposia
9:00–12:15 PM (15-min coffee break around 10:30 AM)

Symposium 4 Cell Interactions and Signaling Pathways 2
9:00–12:15 PM Kane 120

Chair: Gail Martin

269 9:00 Gail Martin (UC San Francisco)
Genetic analysis of FGF gene function in limb development

270 9:30 Jeffery Barrow (Harvard University)
Wnt3 signaling in the limb ectoderm is required for the establishment of the AER

271 9:45 Randall Moon (University of Washington)
Multiple Wnt signaling pathways in vertebrates

272 10:15 Rebecca Burdine (Skirball Institute)
Nodal signaling regulates the laterality of asymmetries in the zebrafish

10:30 Break

273 10:45 Jan Christian (Oregon Health Sciences University)
Calmodulin-dependent protein kinase IV-mediated antagonism of BMP signaling regulates lineage commitment and survival of hematopoietic progenitors

274 11:00 Thomas Kornberg (UC San Francisco)
The role of cytonemes in patterning in Drosophila imaginal discs

275 11:30 Stephen Cohen (European Molecular Biology Laboratory, Germany)
Cell interactions and boundary formation in Drosophila wing development

276 12:00 Nancy Huang (Harvard University)
MEX-3-interacting proteins link cell polarity to asymmetric gene expression in Caenorhabditis elegans

Symposium 5 Patterning the Nervous System

9:00–12:15 PM Kane 210

Chair: Robb Krumlauf

277 9:00 Robb Krumlauf (Stowers Institute for Medical Research)
Patterning vertebrate head development

278 9:30 Andrea Streit (King's College, U.K.)
Early development of the otic placode

279 9:45 Cecilia Moens (Fred Hutchinson Cancer Center)
Hindbrain patterning in the zebrafish: Who helps the Hox genes?

280 10:15 John Timmer (Sloan-Kettering Institute)
BMPs regulate neural patterning via homeobox and bHLH transcription factors

10:30 Break

281 10:45 Yishi Jin (UC Santa Cruz)
Motor neuron axon guidance in Caenorhabditis elegans

282 11:15 Lisa Goodrich (UC San Francisco)
A gene trap screen for axon guidance receptors in mice

11:30 Chris Kintner (Salk Institute)
Regulation of neurogenesis

283 12:00 Nancy Papalopulu (University of Cambridge, U.K.)
Mechanisms for the spatial and temporal control of neurogenesis

Symposium 6 Regulation of Proliferation and Cell Growth

9:00–12:15 PM Kane 110

Chair: Bruce Edgar

284 9:00 Joan Ruderman (Harvard Medical School)
How does progesterone activate the quiescent frog oocyte?

285 9:30 Robert Rea (University of York, UK)
The coordination of cell division in the root meristem of Arabidopsis thaliana

286 9:45 Edward Kipreos (University of Georgia)
Regulation of Caenorhabditis elegans cell cycle by cullin/RING finger complexes

287 10:15 Vikram Sudarsan (University of Cambridge, UK)
Proneural genes prepattern cell proliferation during Drosophila renal tubule organogenesis

10:30 Break

10:45 Bruce Edgar (Fred Hutchinson Cancer Center)
Coordinating growth and cell cycle progression in Drosophila

288 11:15 Molly Duman-Scheel (University of Chicago)
Hedgehog signaling promotes cell growth and proliferation by regulating expression of Rb/E2F pathway components

289 11:30 David Champlin (University of Southern Maine)
Cell cycle by ecdysteroid and nitric oxide during insect metamorphosis

290 11:45 Hans Clevers (University Medical Center Utrecht, The Netherlands)
TCF factors: Mediators of Wnt signaling

12:30–1:30 PM **Lunch** (McMahon)

Poster Session II

1:30–4:00 PM Upper Husky Den
Numbers in ***italics*** indicate the Program Abstract Number.
B numbers indicate the poster Board number.
Odd number boards: Authors present at posters 1:30–3:00 PM
Even number boards: Authors present at posters 9:00–10:30 PM

Development and Evolution

291 B1 Using RNAi to explore short-germband segmentation in *Ocopeltus fasciatus*. P.Z. Liu and T.C. Kaufman. Indiana Univ., Bloomington, IN.

292 B2 Potential for cross-interference with RNAi. J. Norman, E. Bishop, and M.K. Montgomery. Macalester Col., St. Paul, MN.

293 B3 Tools for nematode EvoDevo studies. G. Padilla, S. Goetz, and M.K. Montgomery. Macalester Col., St. Paul, MN.

294 B4 Deep homologies among members of the Hox11 gene family. C.C. Coutinho, R.N. Fonseca, and R. Borojevic. UFRJ, Rio de Janeiro, Brazil.

295 B5 The expression of centipede Hox genes and the evolution of the arthropod body plan. C.L. Hughes and T.C. Kaufman. Indiana Univ., Bloomington, IN.

296 B6 Evolution of the gnathostome body plan. M.J. Cohn. Univ. of Reading, Whiteknights, UK.

297 B7 How to make a pufferfish: Hox clusters and early development in *Fugu rubripes.* A. Amores, T. Suzuki, C.T. Amemiya, and J.H. Postlethwait. Univ. of Oregon, Eugene, OR; Mie NRIA, Nansei, Mie, Japan; and Boston Univ. Sch. of Med., Boston, MA.

298 B8 Distinct functions for the Hox paralogue group 1 genes in neuronal patterning of the zebrafish hindbrain. J.M. McClintock and V.E. Prince. Univ. of Chicago, Chicago, IL.

299 B9 The role of Hoxc8 early enhancer in mouse development. H. Juan and F. Ruddle. Yale Univ., New Haven, CT.

300 B10 The role of NOS in ascidian development. A.P. Jackson and B.J. Swalla. Univ. of Washington, Seattle, WA.

301 B11 Novel early development of the indirect developing sea urchin *Echinometra esculenta* (Euchinoidea, Echinometridae). J.B. Morrill. New Col. of USF, Sarasota, FL.

302 B12 A gap gene ortholog in polychaetes. R. Savage, A. Werbrock, D. Meiklejohn, A. Sainz, and J. Iwasa. Williams Col., Williamstown, MA.

303 B13 Mechanisms of segment formation in polychaete annelids. E.C. Seaver, D.A. Paulson, S.Q. Irvine, S.D. Hill, and M.Q. Martindale. Univ. of Hawaii, Honolulu, HI; Yale Univ., New Haven, CT; and Michigan State Univ.

304 B14 A hedgehog homolog regulates gut formation in leech (Helobdella). D. Kang, F.Z. Huang, D. Li, M. Shankand, W. Gaffield; and D.A. Weisblat. Univ. of California, Berkeley, CA; Stanford Univ., Stanford, CA; Univ. of Texas, Austin, TX; and ARS, USDA, Albany, CA.

305 B15 Supercompact genome in the protochordate *Oikopleura dioica.* H.C. Seo, R.E. Edvardsen, M.F. Jensen, E. Spriet, E.M. Thompson, and D. Chourrout. Sars Intl. Ctr. for Molec. Marine Biol., Bergen, Norway.

306 B16 Proliferation is linked to larval caste fate in the polyembryonic wasp *Copidosoma floridanum*. L.S. Corley and M.R. Strand. Univ. of Wisconsin–Madison, Madison, WI.

307 B17 Targeted disruption of *Dmrt2*, a putative transcription factor, results in abnormal rib patterning and perinatal death. K-W. Seo, B.S. Kim, H. Kokubo, and R.L. Johnson. Univ. of Texas MD Anderson Cancer Center, Houston, TX.

308 B18 *Dpp* expression during biphasic development of the legs in *Manduca sexta*. K. Tanaka and J.W. Truman. Univ. of Washington, Seattle, WA.

309 B19 When is an eyespot not an eyespot? J.M. Marcus. Duke Univ., Durham, NC.

310 B20 Analysis of cxcr4 gene in zebrafish embryogenesis. S.W. Chong, A. Emelyanov, Z. Gong and V. Korzh. Natl. Univ. of Singapore, Singapore.

311 B21 A novel mutation screen in zebrafish using temperature-mediated heteroduplex analysis (TMHA) can detect single base changes in ENU-mutated chromosomes. J.J. Willoughby, B.W. Draper, and J.H. Postlethwait. Univ. of Oregon, Eugene, OR.

312 B22 p63, a homologue of tumor suppressor p53, marks the epithelial stem cell identity in zebrafish. H. Lee, F. McKeon, and D. Kimelman. Univ. of Washington, Seattle, WA; and Harvard Med. Sch., Boston, MA.

313 B23 Variation in the mechanisms driving gastrulation in urodeles and anurans. D.R. Shook and R. Keller. Univ. of Virginia, Charlottesville, VA.

314 B24 Evidence for the coevolution of neural crest and cranial placodes. S.C. Smith and A.C. Graveson.

315 B25 On the role of Sox9 in cartilage formation. B.F. Eames, P.T. Sharpe, and J.A. Helms. Univ. of California, San Francisco, CA; and Guy's Hosp., London, UK.

316 B26 Gene expression in the oral and pharyngeal dentition of two species of teleost fishes. D.W. Stock and K.M. Weiss. Univ. of Colorado, Boulder, CO; and Pennsylvania State Univ., University Park, PA.

317 B27 Subfunctionalization of duplicate *mitf* genes in zebrafish. J.A. Lister, J. Close, and D.W. Raible. Univ. of Washington, Seattle, WA.

318 B28 *Sonic hedgehog* controls the eyeless phenotype in cavefish. Y. Yamamoto, D.W. Stock, and W.R. Jeffery. Univ. of Maryland, College Park, MD; and Univ. of Colorado, Boulder, CO.

319 B29 The importance of lens differentiation in directing eye development of the teleost *Astyanax mexicanus.* A.G. Strickler and W.R. Jeffery. Univ. of Maryland, College Park, MD.

320 B30 Experimental analysis of the "branching and segmentation" model of tetrapod limb development. R.D. Dahn and J.F. Fallon. Univ. of Wisconsin, Madison, WI.

321 B31 Comparative limb morphogenesis in mice and bats. C.J. Cretekos, J.J. Rasweiler IV, and R.R. Behringer. Univ. of Texas M.D. Anderson Cancer Ctr., Houston, TX.

322 B32 Limb development in the short-tailed fruit bat *Carollia perspicillata*. S.D. Weatherbee, C.J. Cretekos, R. Behringer, J.J. Rasweiler IV, and L.A. Niswander. Mem. Sloan Kettering Cancer Ctr., New York, NY; and M.D. Anderson Cancer Ctr., Houston, TX.

323 B33 Evolution of POU/homeodomains in basal metazoa: Implications for the evolution of sensory systems and the pituitary. D.K. Jacobs and R.D. Gates. UCLA, Los Angeles, CA.

324 B34 Seamonster development: Comparative embryology and evolution of the Bilateria. E. Edsinger-Gonzales, M. van der Zee, W.J.A.G. Dictus, and J.A.M. van den Biggelaar. Smithsonian Marine Sta., Fort Pierce, FL; and Univ. of Utrecht, Utrecht, The Netherlands.

325 B35 Further characterization of dorsal- and snail-class genes in the leech *Helobdella robusta.* P. Xiao, D. Kang, and D.A. Weisblat. Univ. of California, Berkeley, CA; and Stanford Univ., Stanford, CA.

326 B36 The evolution of vertebrate *snail* genes. J.A. Langeland and R.A. Rahimi. Kalamazoo Col., Kalamazoo, MI.

327 B37 Juvenile hormone induces a heterochronic shift in cuticle formation and alters growth during embryonic development of Orthoptera. D.F. Erezyilmaz, L.M. Riddiford, and J.W. Truman. Univ. of Washington, Seattle, WA.

328 B38 Metamorphosis. C. Bishop and J. Hodin. Simon Fraser Univ., Burnaby, Canada; and Friday Harbor Labs., Friday Harbor, WA.

Education

329 B39 Evo-Devo 2001: A teaching and research odyssey. A. Candelaria, I. Chevere, M. Colon, E. Geral, J.L. Gonzalez, J.M. Mojica, A. Puig, X. Ramos, N.L. Rivera, K. Salas, I. Soto, A. Tobler, and E. Rosa-Molinar. Univ. of Puerto Rico–Rio Piedras, San Juan, PR.

330 B40 Integration of inquiry-based learning in developmental biology. D.K. Darnell. Lake Forest Col., Lake Forest, IL.

Developmental Biology and Medicine

331 B41 Effect of tumor necrosis factor-α on preimplantation stage embryo development. P.G.L. Lalit Kumar, J. Sengupta, and D. Ghosh. All India Inst. of Med. Sci., New Delhi, India.

332 B42 The genes encoding the mammalian hatching enzymes. D. Rancourt, S. Liu, S. Rancourt, and C. O'Sullivan. Univ. of Calgary, Calgary, Canada.

333 B43 PLP-Cg, a novel member of the prolactin-like protein-C subfamily, produces two alternatively spliced forms. I.-T. Hwang and J.-Y. Chun. Ewha Womans Univ., Seoul, Korea.

334 B44 Defects in TGF β signaling by Smad 4 and ELF spectrins are associated with gastric carcinogenesis. Y. Tang, C. Fox, S. Danovitch, T. Fleury, B. Mishra, A. Sidawy, C. Deng, and L. Mishra. DVAMC, Washington, DC, and Fels Inst., Temple Univ., Philadelphia, PA; George Washington Univ. and Sibley Hosps., Washington, DC; NHGRI and NIDDK, NIH, Bethesda, MD; and VA and Walter Reed Army Med. Ctrs., Washington, DC.

335 B45 Functional analysis of a dominant-negative human *PAX6* mutation in *Drosophila*. T. Glaser, B. Gordesky-Gold, N. Bonini, T.V. Orenic, A. Sugar, and N. Brown. Univ. of Michigan, Ann Arbor, MI; Univ. of Pennsylvania, Philadelphia, PA; Univ. of Illinois, Chicago, IL; and Northwestern Univ. Med. Sch., Chicago, IL.

336 B46 Why do small eye (Pax6+/−) mice have small eyes? J.M. Collinson, J.C. Quinn, M.A. Buchanan, M.H. Kaufman, S.E. Wedden, R.E. Hill, and J.D. West. Univ. of Edinburgh, Edinburgh, UK; and MRC Human Genet. Unit, Edinburgh, UK.

337 B47 Regulation of left–right asymmetry by thresholds of pitx2c activity. C. Liu, W. Liu, M.-F. Lu, N.A. Brown, and J.F. Martin. Texas A&M Syst. Hlth. Sci. Ctr., Houston, TX; and St. George's Hosp. Med. Sch., Univ. of London, London, UK.

338 B48 Analysis of Tbx1 function in *Xenopus laevis*. P. Ataliotis, B. Latinkic, T.J. Mohun, and P.J. Scambler. Inst. of Child Hlth., London, UK; and Natl. Inst. for Med. Res., London, UK.

339 B49 Ethanol teratogenesis in the zebrafish, *Danio rerio.* P.Z. Myers, M. Larson, and M. Hartwell. Univ. of Minnesota at Morris, Morris, MN.

340 B50 Using collagen microcarriers to deliver cells for bone tissue engineering. J.S. Doctor, S. Salvaterra, D. Vitrant, K. Azari, M.A. Ihnat, J.O. Hollinger, and P. Campbell. Carnegie Mellon Univ., Pittsburgh, PA; Duquesne Univ., Pittsburgh, PA; and Univ. of Pittsburgh Med. Ctr., Pittsburgh, PA.

341 B51 *Acetabularia acetabulum*: A novel model for arsenic toxicity. L.S. Townsend, N. Dejbod, W. Cullen, and D. Mandoli. Univ. of Washington, Seattle, WA; and Univ. of British Columbia, Vancouver, Canada.

Cell Proliferation

342 B52 Oxygen deprivation causes reversible developmental arrest in the S and G_2 phases of the cell cycle in zebrafish. P.A. Padilla and M.B. Roth. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

343 B53 Multiple Wee1-like kinases regulate the cell cycle during *Xenopus* development. W.F. Leise and P.R. Mueller. Univ. of Chicago, Chicago, IL.

344 B54 Regulation and degradation of cyclin E in the early embryonic cell cycle. B. Boyle, M. Slevin, Y. Audic, and R.S. Hartley. Univ. of Iowa, Iowa City, IA.

345 B55 XChk1 as a molecular switch between cell cycle arrest and apoptosis in *Xenopus* embryos. J.C. Sible, A.B. Carter, M. Petrus, and B. Johnson. Virginia Tech., Blacksburg, VA.

346 B56 Flk-1 inhibition modulates the Flt-1 mutant phenotype during blood vessel formation. D.M. Roberts, J.H. Johnson, M.P. Rosenberg, and V.L. Bautch. Univ. of North Carolina at Chapel Hill, Chapel Hill, NC; and Glaxo SmithKline Inc., Res. Triangle Park, NC.

347 B57 Flt-1 (VEGFR-1) negatively regulates blood vessel formation by modulating endothelial cell division. J.B. Kearney, C.A. Ambler, K.A. Monaco, N. Johnson, R.G. Rapoport, and V.L. Bautch. Univ. of North Carolina at Chapel Hill, Chapel Hill, NC.

348 B58 Identifying modifiers of cyclin D/CDK4-directed overgrowth. L.J. Saucedo, S.A. Datar, and B.A. Edgar. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

349 B59 Regulation of cell growth and adhesion by *Drosophila* Ras1. D.A. Prober and B.A. Edgar. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

350 B60 Conditional expression of Axin by the tetracycline-dependent system in transgenic mice: The role of Axin in regulating cell growth, differentiation, and death during the postnatal development of mice. W. Hsu and F. Costantini. Col. of Physicians and Surgeons, Columbia Univ., New York, NY.

351 B61 Expression of thymosin β4 in different proliferation of murine bone marrow endothelial cells. J. Huang, W. Huang, and Q. Wang. Central South Univ., Changsha, China.

352 B62 A conserved leucine in RbAp46, a WT1 target, is required for growth suppression. J. Yang, J.R. McCarty, and M.I. Rauchman. Washington Univ. Sch. of Med., St. Louis, MO.

Cell Lineage

353 B63 Is there a role for asymmetric division in *Arabidopsis* development? D.C. Bergmann and C.R. Somerville. Carnegie Inst. of Washington, Stanford, CA.

354 B64 Developmental timing in *Caenorhabditis elegans*. H. Gardner, M. Jeon, and A. Rougvie. Univ. of Minnesota, St. Paul, MN.

355 B65 Cardiac neural crest in zebrafish. M. Sato and H.J. Yost. Univ. of Utah, Salt Lake City, UT.

356 B66 Characterization of the zebrafish hematopoietic system by flow cytometry. D. Traver, N. Kotsopoulou, R. Mulligan, and L. Zon. HHMI and Children's Hosp., Boston, MA.

357 B67 Primitive and definitive blood share a common origin in early *Xenopus*: A comparison of lineage labeling techniques. M.C. Lane and M.D. Sheets. Univ. of Wisconsin, Sch. of Med., Madison, WI.

358 B68 Cranial neuroectoderm produces vascular smooth muscle cells and pericytes in brain. H. Kurz, J. Korn, and B. Christ. Univ. of Freiburg, Freiburg, Germany.

359 B69 Conditionally immortalized cell line of metanephric mesenchyme. Z.B. Levashova, S.Y. Plisov, and A.O. Perantoni. Natl. Cancer Inst., Frederick, MD.

360 B70 Conditional genetic ablation using *pu*Δ*tk* and Cre/*lox*P technology. Y.T. Chen and A. Bradley. Baylor Col. of Med., Houston, TX; and The Sanger Ctr., Cambridge, UK.

Signaling Pathways

361 B71 The COP9 signalosome regulates multiple pleiotropic pathways in *Drosophila melanogaster*. E. Oron, O. Harari-Steinberg, S. Rencus, N. Egoz, D. Segal, and D.A. Chamovitz. Tel Aviv Univ., Tel Aviv, Israel.

362 B72 Localization of flamingo in the *Drosophila* eye disc and its prospective role in eye development. G. Das and M. Mlodzik. Mount Sinai Sch. of Med., New York, NY.

363 B73 Germinal vesicle breakdown in ascidian oocytes is controlled by kinases and phosphatases. C.C. Lambert. Univ. of Washington, Friday Harbor, WA.

364 B74 The role of NO/cGMP and HSP90 in regulating metamorphosis of the sea urchin *Lytechinus pictus*. C.D. Bishop and B.P. Brandhorst. Simon Fraser Univ., Burnaby, Canada.

365 B75 PKC and embryonic organization in *Ilyanassa obsoleta.* J. Wandelt and L. Nagy. Univ. of Arizona, Tucson, AZ.

366 B76 GPI-linked and transmembrane ephrins are localized in distinct membrane microdomains and regulate different biological processes. A. Davy and S.M. Robbins. Univ. of Calgary, Calgary, Canada.

367 B77 Relieving TCF-mediated repression during zebrafish embryogenesis—A role for nemo-like kinase? C.J. Thorpe and R.T. Moon. Univ. of Washington, Seattle, WA.

368 B78 HeyL: A new mammalian mediator of Notch signaling. C. Steidl, K.P. Knobeloch, C. Leimeister, M. Maier, and M. Gessler. Univ. of Wuerzburg, Wuerzburg, Germany; and Res. Inst. for Molec. Pharmacol., Berlin, Germany.

369 B79 Spatial and temporal patterns of RTK signaling in the developing mouse embryo. L. Corson, M. Ema, V. Lai, and J. Rossant. Samuel Lunenfeld Res. Inst., Mount Sinai Hosp., Toronto, Canada.

370 B80 Targeted genomic disruption of *Mek2* reveals its dispensability for mouse growth and development. J. Charron, L. Bélanger, M. Tremblay, B. Brott, and R. Erikson. Univ. of Laval, L'Hotel-Dieu de Quebec, Quebec, Canada; and Harvard Univ., Cambridge, MA.

371 B81 The nuclear translocation of phosphorylated MAP kinase is a developmentally regulated process in the developing *Drosophila* eye. J.P. Kumar and K. Moses. Emory Univ. Sch. of Med., Atlanta, GA.

372 B82 A misexpression screen to identify novel regulators of growth and proliferation in *Drosophila*. R.E. Foulger, D.C.I. Goberdhan, and C. Wilson. Univ. of Kent, Canterbury, UK.

373 B83 The functions of the proteoglycan syndecan in *Drosophila* development. T.R. Heslip, K.H. Soanes, O. Marcu, and J.L. Marsh. Univ. of Calgary, Calgary, Canada; and Univ. of California–Irvine, Irvine, CA.

374 B84 Are Wnts ligands for planar polarity signaling? C.Y. Logan, C-H. Wu, A. Aurora, K. Cadigan, and R. Nusse. Stanford Univ., Stanford, CA.

35 B85 GSK-3 interactions with GBP and axin in early *Xenopus* development. D.M. Ferkey and D. Kimelman. Univ. of Washington, Seattle, WA.

376 B86 Difference in dependency on XTcf-3 function accounts for the dramatic change of response to Wnt signaling at midblastula transition in *Xenopus*. S. Hoppler, F.S. Hamilton, and G.N. Wheeler. Univ. of Dundee, Scotland, UK.

37 B87 Frizzled-dependent apoptosis in *Xenopus* embryos. K. Itoh, M. Lisovsky, and S.Y. Sokol. Harvard Med. Sch. and Beth Israel Deaconess Med. Ctr., Boston, MA.

378 B88 PP2A and its B56 regulatory subunit inhibit Wnt signaling in *Xenopus*. J.M. Seeling, X. Li, H.J. Yost, and D.M. Virshup. Univ. of Utah, Salt Lake City, UT.

379 B89 Dpr, a Wnt signaling antagonist, binds to the Dsh PDZ domain and colocalizes with Dsh. B.N.R. Cheyette, J.R. Miller, N. Khlebtsova, K-I. Takemaru, L.C. Sheldahl, J.S. Waxman, T. Earnest, and R.T. Moon. Univ. of Washington Sch. of Med., Seattle, WA; and Lawrence Berkeley Natl. Lab., Berkeley, CA.

380 B90 Withdrawn

381 B91 Derepression of nodal signaling by FoxD3 is essential for *Xenopus* mesoderm formation. M.J. Engleka, J. Lefebvre, S. Yaklichkin, A. Steiner, E.J. Craig, P.A. Labosky, and D.S. Kessler. Univ. of Pennsylvania Sch. of Med., Philadelphia, PA.

382 B92 Amnionless, an essential gene for mouse gastrulation, encodes a visceral endoderm-specific protein with an extracellular cysteine-rich domain. S. Manning, S. Kalantry, R. Rivi, F. Lupu, and E. Lacy. Sloan-Kettering Inst., New York, NY.

383 B93 The zebrafish *umleitung* locus affects hh signaling and forebrain patterning. O. Tyurina and R. Karlstrom. Univ. of Massachusetts, Amherst, MA.

384 B94 Sonic hedgehog signaling is required for formation of the dorsal aorta. A.M. Vogel, N.D. Lawson, and B.M. Weinstein. NICHD, NIH, Bethesda, MD.

385 B95 Ptc1 and Ptc2 transcripts provide distinct readouts of hedgehog signaling activity during chick embryogenesis. R.V. Pearse, K.J. Vogan, and C.J. Tabin. Harvard Med. Sch., Boston, MA.

386 B96 A screen to identify Indian hedgehog target genes involved in bone formation. M. Wenzel, S. Schneider, W. Gaffield, and A. Vortkamp. Max-Planck-Inst. for Molec. Genet., Berlin, Germany; and Western Reg. Res. Ctr., ARS, USDA, Albany CA.

387 B97 Interaction of Ihh, BMP, and FGF signaling during chondrocyte differentiation. E. Minina, C. Kreschel, M. Wenzel, and A. Vortkamp. Max-Planck-Inst. for Molec. Genet., Berlin, Germany.

388 B98 A screen to identify new genes involved in the development of skeletal elements. K. Lintermann, S. Schneider, and A. Vortkamp. Max-Planck-Institut for Molec. Genet., Berlin, Germany.

389 B99 Tissue-specific knockout shows that BMP signaling is required for articular cartilage maintenance in vertebrate joints. R.B. Rountree, M. Schoor, M. Marks, Y. Mishina, and D. Kingsley. Stanford Univ., Stanford, CA; and NIEHS/NIH, Res. Triangle Park, NC.

390 B100 Endogenous patterns of BMP signaling during chicken development. P. de Santa Barbara, S. Faure, M. Whitman, and D.J. Roberts. Massachusetts Gen. Hosp., Harvard Med. Sch., Boston, MA.

391 B101 A novel cleavage site within pro-BMP-4 regulates the bioactivity and signaling range of the BMP-4 ligand. Y. Cui, L. Berg, R. Hackenmiller, T. Nakayama, F. Jean, G. Thomas, and J. Christian. Oregon Hlth. Sci. Univ., Portland, OR.

392 B102 Calmodulin-dependent protein kinase IV-mediated antagonism of BMP signaling regulates lineage commitment and survival of hematopoietic progenitors. G.A. Wayman, M.J. Walters, J.C. Notis, R.H. Goodman, T.R. Soderling, and J.L. Christian. Vollum Inst. and Oregon Hlth. Sci. Univ., Portland, OR.

393 B103 Local and long-range requirements for the BMP homolog *glass bottom boat* in the *Drosophila* wing disk reveal novel mechanisms for signaling by multiple BMPs. R.P. Ray and K.A. Wharton. Brown Univ., Providence, RI.

394 B104 Control of cell growth and differentiation by TGFβ-related signaling in *Caenorhabditis elegans*. C. Savage-Dunn, R. Tokarz, and L. Yu. CUNY, Flushing, NY.

395 B105 SNT-1 is a component of the FGF pathway that functions during *Xenopus* development. J. Hama, M. Goldfarb, and D.C. Weinstein. Mount Sinai Sch. of Med., New York, NY.

396 B106 Regulation of *fgf-19:* Signaling hierarchies controlling otic development. R.K. Ladher, P.H. Francis-West, and G.C. Schoenwolf. Univ. of Utah Sch. of Med., Salt Lake City, UT.

397 B107 Insulin-like growth factors promote somite myogenesis in the avian embryo. J.C. Kiefer, A. Pirskanen, and S.D. Hauschka. Univ. of Washington, Seattle, WA.

398 B108 The mouse gastrulation mutant *lazy mesoderm*: A novel component of the FGF pathway? M.J. García-García and K.V. Anderson. Mem. Sloan-Kettering Inst., New York, NY.

399 B109 A quantitative relationship exists between the number of functional PDGFRβ signaling pathways and the formation of pericytes. M.D. Tallquist and P. Soriano. Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

400 B110 A biochemical function for Attractin in Agouti-induced pigmentation and obesity. L. He, T.M. Gunn, D.M. Bouley, X. Lu, J.S. Duke-Cohan, and G.S. Barsh. Stanford Univ., Stanford, CA; Univ. of Michigan, Ann Arbor, MI; and Dana-Farber Cancer Inst., Harvard Med. Sch., Boston, MA.

401 B111 Structure–function studies of caveolae in Smith Lemli Opitz disease. J.V. Sutton and R.K. Keller. Col. of Med., Univ. of South Florida, Tampa, FL.

Gene Expression

402 B112 Gene expression database for the laboratory mouse. D.A. Begley, J.T. Eppig, T. Hayamizu, D.P. Hill, J. Kadin, I.J. McCright, J. Richardson, C. Smith, and M. Ringwald. The Jackson Lab., Bar Harbor, ME.

403 B113 A computational approach to the dissection of genetic regulatory networks involved in metazoan development. M.S. Halfon, Y. Grad, G. Church, and A.M. Michelson. Brigham & Women's Hosp. and Harvard Med. Sch., Boston, MA.

404 B114 A functional genomic approach to neural crest gene discovery and analysis using a combination of expression profiling and *in vitro* expression. D. Larson, S. Loftus, D. Watkins-Chow, L. Baxter, A. Antonellis, K. Joyce Dunn, and W. Pavan. NIH, Bethesda, MD.

405 B115 Microarrays in neural stem cell systems. F.C. Mansergh, S.E. Minnema, M.A. Wride, J.M. Somani, J.E. Hance, S. Weiss, and D.E. Rancourt. Univ. of Calgary, Calgary, Canada.

406 B116 Expression profile analysis to dissect genetic mechanisms of neural crest development. S.K. Loftus, L.L. Baxter, D.M. Larson, and W.J. Pavan. Natl. Institutes of Hlth., Bethesda, MD.

407 B117 Combinatorial regulation of LIM homeodomain transcription factors by LIM domain binding proteins. H.P. Ostendorff, M. Peters, R.I. Peirano, and I. Bach. Univ. of Hamburg, Hamburg, Germany.

408 B118 Rescue of the *shootmeristemless* (*stm*) mutant phenotype by expression of *STM* mRNA in a subset of its normal domain: Implications for nonautonomous action of the STM transcription factor in *Arabidopsis thaliana*. A.G. Fernandez, J.A. Long, R.E. Joy, and M.K. Barton. Univ. of Wisconsin–Madison, Madison, WI.

409 B119 Regulation of *OSL*, a *LFY* homologue, during rice panicle and spikelet development. K. Prasad and U. Vijayraghavan. Indian Inst. of Sci., Bangalore, India.

410 B120 Determination of intraplant ploidy variation in *Spathoglottis plicata*, a tropical orchid, by flow cytometry. M-C. Yang and C.S. Loh. Natl. Univ. of Singapore, Singapore.

411 B121 A homolog of mammalian hypoxia-inducible factor-1α is required for adaptation to low oxygen in *Caenorhabditis elegans*. H. Jiang, R. Guo, and J.A. Powell-Coffman. Iowa State Univ., Ames, IA.

412 B122 Broad complex: A pupal-specific transcription factor that mediates the "status quo" effects of juvenile hormone. X. Zhou and L.M. Riddiford. Univ. of Washington, Seattle, WA.

413 B123 mRNA 5′-leader transsplicing in the chordates. T.H. Meedel, A.E. Vandenberghe, and K.E.M. Hastings. Rhode Island Col., Providence, RI; and McGill Univ., Montreal, Canada.

414 B124 Positional cloning of the gene disrupted in the zebrafish notochord mutant, *bashful*. S.M. Pollard, M.J. Parsons, and D.L. Stemple. Natl. Inst. for Med. Res., London, UK.

415 B125 Investigating the regulatory elements controlling *Sox10* expression in zebrafish. J.R. Dutton, T. Carney, A.W. Ward, and R.N. Kelsh. Univ. of Bath, Bath, UK.

416 B126 Characterization of the onset timing and expression pattern of Mab21 genes in zebrafish. K.L. Chow and Y.M. Wong. Hong Kong Univ. of Sci. and Technol., Hong Kong.

417 B127 Zebrafish novel immune-type receptors (*nitr*) are putative orthologs of the genes encoded by the mammalian lymphocyte receptor complex (LRC). J.A. Yoder, S. Wei, J.Y. Djeu, and G.W. Litman. Children's Res. Inst., Univ. of South Florida and All Children's Hosp., St. Petersburg, FL; and H. Lee Moffitt Cancer Ctr. and Res. Inst., Tampa, FL.

418 B128 Use of transgenic *Xenopus* embryos to analyze the Xath5 promoter. D.A. Hutcheson and M.L. Vetter. Univ. of Utah Sch. of Med., Salt Lake City, UT.

419 B129 Transgenic technology and targeted gene expression in *Xenopus laevis* using the GAL4/UAS system. A. Rolo, P. Skoglund, and R. Keller. Univ. of Virginia, Charlottesville, VA.

420 B130 Translational regulation of cyclin A1 during early embryogenesis. Y. Audic, M. Garbrecht, B. Boyle, and R.S. Hartley. Univ. of Iowa, Iowa City, IA.

421 B131 Functional studies of the *Xenopus* polycomb-group proteins Xeed and Xez. C. Showell, J.B. Rafferty, and V.T. Cunliffe. Univ. of Sheffield, Sheffield, UK.

422 B132 Regulated translation of BMP signaling pathway mRNAs during frog embryogenesis. B.R. Fritz and M.D. Sheets. Univ. of Wisconsin, Madison, WI.

423 B133 Regulation of ectodermal patterning in *Xenopus* by differential sensitivity of Dlx homeodomain genes to BMP signal attenuation. T. Luo, M. Matsuo-Takasaki, and T.D. Sargent. NICHD, Natl. Inst. of Hlth., Bethesda, MD.

424 B134 Regulation of *sox3* expression in *Xenopus laevis*. E. Silva Casey and R. Harland. Univ. of California, Berkeley, CA.

425 B135 Characterization and expression of the mRNAs encoding the tadpole and adult globins during spontaneous and thyroid hormone-induced amphibian metamorphosis. R. Gowing and B.G. Atkinson. Univ. of Western Ontario, London, Canada.

426 B136 Muscle-specific, cytosolic creatine kinase mRNA levels are elevated in muscle of thyroid hormone-induced metamorphozing amphibian tadpoles. L.F. Petersen and B.G. Atkinson. Univ. of Western Ontario, London, Canada.

427 B137 Characterization of an amphibian α smooth muscle actin gene and its expression in the heart and developing limb of metamorphozing tadpoles. L. Zheng and B.G. Atkinson. Univ. of Western Ontario, London, Canada.

428 B138 Transgenic studies into cardiac troponin I gene regulation during the postembryonic development (metamorphosis) of the amphibian tadpole. A.S. Warkman and B.G. Atkinson. Univ. of Western Ontario, London, Canada.

429 B139 Analysis of AER enhancer elements in the chicken Msx2 gene. H.C. Cheng, Z.Z. Pan, C.K.L. Wang, and W.B. Upholt. Univ. of Connecticut Hlth. Ctr., Farmington, CT; Fox Chase Cancer Ctr., Philadelphia, PA; and Academia Sinica, Taiwan.

430 B140 Isolation of a novel member of the spalt family of zinc finger genes in chickens. M. Barembaum and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA.

431 B141 Regionally restricted expression pattern of Id helix–loop–helix genes during early avian embryogenesis. Y. Kee and M. Bronner-Fraser. California Inst. of Technol., Pasadena, CA.

432 B142 Establishment of distinct signaling centers in the avian frontonasal process. R.S. Marcucio, M. Tong, and J.A. Helms. Univ. of California, San Francisco, CA.

433 B143 Hox gene expression within the embryonic skin is dynamic. A.I. Reid and S. Gaunt. Babraham Inst., Cambridge, UK.

434 B144 Wnt signaling in avian kidney development. T.J. Mauch, R. Ladher, P. García-Villalba, D.E. Smith, and G.C. Schoenwolf. Univ. of Utah Sch. of Med., Salt Lake City, UT.

435 B145 Colinear expression of the mouse HoxB cluster: Potential role of chromatin remodeling. J.E. Basford and S. Bradshaw. Univ. of Cincinnati, Cincinnati, OH.

436 B146 Novel ring finger proteins PRAJA-1 and AVP-36 play distinct roles in ubiquitination and protein trafficking in epithelial cell formation. C. Fox, Y. Tang, A. Subramanian, C. Banumathy, S. Radhakrishnan, B. Mishra, A. Sidawy, and L. Mishra. DVAMC, Washington, DC, and Fels Cancer Inst., Temple Univ., Philadelphia, PA; and VA and Walter Reed Army Med. Ctrs., Washington, DC.

437 B147 Cloning and expression analysis of OSR2, a new mouse gene related to *Drosophila* odd-skipped. Y. Lan, E.S. Cho, P.D. Kingsley, and R.J. Jiang. Univ. of Rochester Sch. of Med. and Dent., Rochester, NY.

438 B148 Identification of potential *cis*-acting regulatory elements in the mouse *Fibroblast growth factor 10* locus. J.C. Grindley, L. O'Rear, Z. Liu, D. Perkins, S. Bellusci, and M.G. Rush. Vanderbilt Univ., Nashville, TN.

439 B149 Transcriptional effects of altering protein kinase C distribution in four-cell-stage mouse embryos. H. Dehghani and A. Hahnel. Univ. of Guelph, Guelph, Canada.

440 B150 Analysis of genes differentially expressed between morula and blastocyst. T.S. Tanaka and M.S.H. Ko. Natl. Inst. on Aging/NIH, Baltimore, MD.

441 B151 Molecular characterization of the Twis allele of the mouse Brachyury gene. S.N. Hancock and V.E. Papaioannou. Columbia Univ., New York, NY.

442 B152 Gene expression during somitogenesis. L.A. Buttitta, T.S. Tanaka, M.S. Ko, and C.M. Fan. Carnegie Inst. of Washington, Baltimore, MD; and Natl. Inst. on Aging, NIH, Bethesda, MD.

443 B153 A novel mouse zinc finger isolated from an embryonic stem cell neural differentiation paradigm. M.A. Wride, F.C. Mansergh, R. Everitt, J.E. Hance, and D.E. Rancourt. Univ. of Calgary, Calgary, Canada.

444 B154 Isolation of putative AP-2α target genes from craniofacial mesenchyme. D.K. Nelson and T. Williams. Yale Univ., New Haven, CT; and Univ. of Colorado Hlth. Sci. Ctr., Denver, CO.

445 B155 Antagonistic regulation of *Dlx2* expression by PITX2 and Msx2: Implications for tooth development. P.D. Green, D.E. Kirk, T.A. Hjalt, L.B. Sutherland, B.L. Thomas, M.L. Snead, and B.A. Amendt. Univ. of Tulsa, Tulsa, OK; Univ. of Iowa, Iowa City, IA; Univ. of London, London, UK; and Univ. of Southern California, Los Angeles, CA.

446 B156 Identification of differentially expressed genes in *Tabby* mutant mice using subtractive hybridization. R.T. Jaatinen and I. Thesleff. Univ. of Helsinki, Helsinki, Finland.

447 B157 Analysis of *in vivo* genetic ablation of the hippocampus, cingulate cortex, and dentate gyrus in mice. O. Medina, H. Ma, and M. Jamrich. Baylor Col. of Med., Houston, TX.

448 B158 The expression pattern of the cdo gene in the developing cerebral cortex. A. Okada and S. McConnell. Stanford Univ., Stanford, CA.

449 B159 The role of MEF2C in cardiac chamber specification. L.R. Jalbert, W. Bi, P. Cserjesi, and J.J. Schwarz. Albany Med. Col., Albany, NY; Univ. of Texas Med. Sch., Houston, TX; and Louisiana State Univ. Hlth. Sci. Ctr., New Orleans, LA.

450 B160 Developmental regulation of alternative splicing correlates with a switch from nuclear to cytoplasmic isoforms of the splicing activator, ETR-3. A.N. Ladd and T.A. Cooper. Baylor Col. of Med., Houston, TX.

451 B161 Pax3 hypaxial muscle expression is regulated by unique and separable enhancer elements. C.B. Brown and J.A. Epstein. Univ. of Pennsylvania, Philadelphia, PA.

452 B162 Conservation of adjacent Pax3 and Sox10 binding sites in mouse and human c-ret enhancer. D. Lang and J.A. Epstein. Univ. of Pennsylvania, Philadelphia, PA.

453 B163 Identifying regulatory regions conferring progenitor versus postmitotic neuron expression of a retinal transcription factor. S. Rowan and C.L. Cepko. Harvard Med. Sch., Boston, MA.

454 B164 Mouse Six3 interacts with the Groucho-like Grg protein and functions as a transcriptional repressor. C.C. Zhu, O.V. Lagutin, and G. Oliver. St. Jude Children's Res. Hosp., Memphis, TN.

455 B165 Quantification of right-handed B-DNA in hereditary cataracts. C.E. Gagna, E. Lorig, J. Coutinho, and W.C. Lambert. New York Inst. of Technol., Old Westbury, NY; and UMDNJ–Med. Sch., Newark, NJ.

456 B166 Characterization of the zebrafish ortholog of the human tumor suppressor FHIT. A.P. O'Connor, Y. Pekarsky, C. Croce, C. Brenner, and S.A. Farber. Thomas Jefferson Univ., Philadelphia, PA.

Patterning

457 B167 Possible involvement of light and auxin in plant–plant interaction. M. Fellner, A. Cocke, L. Horton, E.D. Ford, J.D. Cohen, and E. Van Volkenburgh. Univ. of Washington, Seattle, WA; and Univ. of Minnesota, St. Paul, MN.

458 B168 Evidence for independent systems for the communication of positional information in epithelial and interstitial cells in Hydra. S.L. Kauffman, S. Sherman, and A. Grens. Indiana Univ., South Bend, IN.

459 B169 Regulation of cell fusion in *Caenorhabditis elegans*. S. Alper and C. Kenyon. Univ. of California, San Francisco, CA.

460 B170 p38 activity is required for embryonic skeletal patterning in the sea urchin. C.A. Bradham and D.R. McClay. Duke Univ., Durham, NC.

461 B171 T-box genes in the sea urchin, *Lytechinus variegatus.* J.M. Gross and D.R. McClay. Duke Univ., Durham, NC.

462 B172 Goosecoid and BMP2/4–Smad5 pathways have separable roles along the sea urchin embryo oral–aboral axis. L.M. Angerer, D.W. Oleksyn, A.M. Levine, X. Li, W.H. Klein, and R.C. Angerer. Univ. of Rochester, Rochester, NY; and Univ. of Texas MD Anderson Cancer Ctr., Houston, TX.

463 B173 Statistical features of expression of the segmentation genes in early *Drosophila* development at single-nucleus resolution. A.V. Spirov, D.M. Holloway, D. Kosman, and J. Reinitz. Russian Acad. of Sci., St. Petersburg, Russia; Univ. of British Columbia, Vancouver, Canada; Univ. of California, San Diego, CA; and SUNY at Stony Brook, Stony Brook, NY.

464 B174 *Drosophila* bunched maintains a cell fate boundary by regulating Notch signaling. L.A. Raftery and L.L. Dobens. Massachusetts Gen. Hosp., Harvard Med. Sch., Charlestown, MA.

465* B175 *Poster moved to Poster Session II, B175

466 B176 Isolation of factors that directly interact with Sine oculis. K.L. Kenyon, C.R. Clouser, and F. Pignoni. Harvard Med. Sch./MEEI, Boston, MA.

467 B177 The *Drosophila* Dx16 gene encodes a member of the serine/arginine-rich family of splicing factors that affects pattern formation in imaginal discs. W. Xie, R. Battye, and G.L. Boulianne. Hosp. for Sick Children, Toronto, Canada; Univ. of Toronto, Toronto, Canada; and Southeast Univ. Med. Sch., Nanjing, P.R. China.

468 B178 Generating and interpreting graded positional information in the *Drosophila* wing. G. Campbell. Univ. of Pittsburgh, Pittsburgh, PA.

469 B179 *Short gastrulation* interacts with integrins during wing vein development. H.M. Araujo, E.M. Negreiros, and E. Bier. Fed. Univ.of Rio de Janeiro, Brazil; and Univ. of California at San Diego, San Diego, CA.

470 B180 EGF and TGF-β signaling collaborate in the patterning of the follicular epithelium during *Drosophila* oogenesis. F. Peri, A. Klaes, and S. Roth. Univ. of Cologne, Cologne, Germany.

471 B181 Might sperm chromatin condensation patterns be determined kinetically, e.g., by reaction–diffusion? L.G. Harrison, H.E. Kasinsky, and M. Chiva. Univ. of British Columbia, Vancouver, Canada; and Univ. of Barcelona, Barcelona, Spain.

472 B182 A mutagenesis screen to identify maternal factors required in early zebrafish development. D.S. Wagner, R. Dosch, K.A. Mintzer, and M.C. Mullins. Univ. of Pennsylvania Med. Sch., Philadelphia, PA.

473 B183 Phenotypic analysis of a mutation that disrupts segmental gene expression in zebrafish. K.K. Dill and S.L. Amacher. Univ. of California, Berkeley, CA.

474 B184 Cloning and charcterization of novel T-box genes in zebrafish. M. Nikaido and K. Araki. Natl. Res. Inst. of Aquaculture, Mie, Japan.

475 B185 Mutations affecting neural crest development in the zebrafish. A. Barrallo Gimeno and E.W. Knapik. GSF Res. Ctr. for Envrn. and Health, Neuherberg, Germany.

476 B186 Bonnie and clyde functions in axial mesendoderm to regulate the Wnt inhibitor dickkopf-1 in anterior patterning. L.A. Trinh and D.Y.R. Stainier. Univ. of California at San Francisco, San Francisco, CA.

477 B187 Fgf8 and gFgf function to regulate the production of posterior mesoderm in zebrafish. B.W. Draper, D.W. Stock, and C.B. Kimmel. Univ. of Oregon, Eugene, OR; and Univ. of Colorado, Boulder, CO.

478 B188 The spatial and temporal role of *lost-a-fin/activin receptor-like kinase 8* in vertebrate dorsoventral patterning. K.A. Mintzer and M.C. Mullins. Univ. of Pennsylvania Sch. of Med., Philadelphia, PA.

479 B189 Pbx and Meis genes are essential for the specification of rhombomere identity in zebrafish. A.J. Waskiewicz, H.A. Rikhof, H. Pöpperl, and C.B. Moens. Fred Hutchinson Cancer Res. Ctr., Seattle, WA; and Deutsches Krebsforschungszentrum, Heidelberg, Germany.

480 B190 The role of placticity in boundary formation in the zebrafish hindbrain. J.E. Cooke and C.B. Moens. HHMI, Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

481 B191 *lzr/Hox*-dependent specification of cranial motor neuron fates in the anterior zebrafish hindbrain. K.L. Cooper and C.B. Moens. HHMI, Fred Hutchinson Cancer Res. Ctr., Seattle, WA.

482 B192 *Spiel ohne grenzen/pou2* is required for early steps in the establishment of the zebrafish mid-/hindbrain boundary. H.-G. Belting, G. Hauptmann, D. Meyer, S. Abdelilah-Seyfried, A.J. Chitnis, C. Eschbach, C. Thisse, B. Thisse, I. Söll, K.B. Artinger, and W. Driever. Univ. Freiburg, Freiburg, Germany; Univ. of California, San Francisco, CA; NIH/NICHD, Bethesda, MD; IGBMC, Illkirch, France; and Harvard Med. Sch., Boston, MA.

483 B193 Characterization of *caudal hindbrain defective*, a novel gene which affects caudal hindbrain pattern in zebrafish. E.L. Wiellette and H.L. Sive. Whitehead Inst. for Biomed. Res., Cambridge, MA.

484 B194 Analysis of the role of *dlx3* and *dlx7* in zebrafish sensory placode development. K.S. Solomon and A. Fritz. Emory Univ., Atlanta, GA.

485 B195 The role of SHH in patterning the zebrafish pituitary gland. J.L. Sbrogna and R. Karlstrom. Univ. of Massachusetts, Amherst, MA.

486 B196 The Krüppel-like factor biklf mediates erythroid cell differentiation in zebrafish. A. Kawahara and I.B. Dawid. Natl. Inst. of Child Hlth. and Human Devel., Natl. Inst. of Hlth., Bethesda, MD.

487 B197 Large-scale mutagenesis screen to define hemangioblast development in the zebrafish. B. Schmid, K.A. Dooley, A. Davidson, N. White, The Tubingen 2000 Screen Consortium, and L.I. Zon. Children's Hosp., Howard Hughes Med. Inst., Boston, MA; Artemis Pharmaceuticals, Tubingen, Germany; and Max-Planck Inst. for Entwicklungbiologie, Tubingen, Germany.

488 B198 The FGFR pathway is required for the trunk-inducing functions of Spemann's organizer. T.M. Smith and M.D. Sheets. Univ. of Wisconsin, Madison, WI.

489 B199 The competence to establish Spemann's organizer is actively restricted in space and time. V. Levy, K. Marom, S. Zins, N. Koutsia, R. Yelin, and A. Fainsod. Hebrew Univ., Hadassah Med. Sch., Jerusalem, Israel.

490 B200 Dorsal inductive competence and the Wnt pathway. R.S. Darken, A.M. Zappia, and P.A. Wilson. Cornell Univ. Med. Col., New York, NY.

491 B201 Regulation of BMP signaling by Chordin, Xolloid, and Twisted gastrulation. M. Oelgeschläger, J. Larraán, N. Ketpura, B. Reversade, and E.M. De Robertis. UCLA, Los Angeles, CA.

492 B202 *Bicaudal-C* is a localized maternal mRNA involved in endoderm development. O. Wessely, U. Tran, L. Zakin, and E.M. De Robertis. HHMI/UCLA, Los Angeles, CA.

493 B203 Maternal Dapper is required for the specification of dorsal/anterior structures in vertebrate development. J.S. Waxman, J.D. Brown, J.B. Webster, B.N.R. Cheyette, and R.T. Moon. Univ. of Washingtn, Seattle, WA; and Univ. of Washington Sch. of Med., Seattle, WA.

494 B204 Syndecan 2 mediates early *Xenopus* left–right development as a functionally asymmetric coordinator. K.L. Kramer and H.J. Yost. Univ. of Utah, Salt Lake City, UT.

495 B205 The novel gene *Ashwin* functions in neural specification and axial patterning in *Xenopus*. S.S. Patil, T.B. Alexander, J.A. Uzman, and A.K. Sater. Univ. of Houston, Houston, TX; and Univ. of Houston–Downtown, Houston, TX.

496 B206 *Pitx* genes act as cofactors of *otx2* in the specification of the cement gland. A. Schweickert, H. Steinbeisser, and M. Blum. Forschungszentrum Karlsruhe, Karlsruhe; and Max-Planck-Institut, Tübingen, Germany.

497 B207 Characterization of the *Xenopus laevis Rx1A* promoter in transgenic frogs. H.M. El-Hodiri, L. Zhang, H.F. Ma, and M. Jamrich. Baylor Col. of Med., Houston, TX.

498 B208 Analysis of genes expressed during *Xenopus laevis* hindlimb regeneration using subtractive hybridization. M. King, T. Nguyen, A. Mescher, M. Harty, C. Chalfant, P. Sankhavaram, D. Stocum, R. Smith, and A. Neff. Terre Haute Ctr. for Med. Educ., Terre Haute, IN; Indiana Univ., Bloomington, IN; IUPUI, Indianapolis, IN; and Lilly Res. Labs., Indianapolis, IN.

499 B209 cGMP enhances the Shh response in neural plate cells. C.P. Robertson, S.M. Gibbs, and H. Roelink. Univ. of Washington, Seattle, WA.

500 B210 The zona limitans intrathalamica as a signaling center in forebrain development. M. Braun and H. Roelink. Univ. of Washington, Seattle, WA.

501 B211 *In vivo* electroporation of cDNA into heart tissue: Cell fate control by Notch after linear heart tube stage in the chick. J.B. Rutenberg and M. Mercola. Harvard Med. Sch., Boston, MA.

502 B212 A role for carboxypeptidase Z in somite differentiation. C. Moeller, E.C. Swindell, and G. Eichele. Max Planck Inst. for Exptl. Endocrinol., Hannover, Germany; and Baylor Col. of Med., Houston, TX.

503 B213 FGF signaling regulates expression of *Tbx2*, *Erm*, *Pea3*, and *Pax3* during chick craniofacial development. N. Firnberg and A. Neubüser. Inst. of Molec. Pathol., Vienna, Austria.

504 B214 Effect of the cleft primary palate mutation on chick craniofacial development. M.E. MacDonald and J.M. Richman. Univ. of British Columbia, Vancouver, Canada.

505 B215 Patterning of craniofacial skeleton by endogenous retinoids. J.N. Hui, V.M. Diewert, and J.M. Richman. Univ. of British Columbia, Vancouver, Canada.

506 B216 Mechanism of epidermal growth factor action in avian skin development. R.P. Atit and L.A. Niswander. Sloan-Kettering Inst., New York, NY.

507 B217 BMP4 signaling in early mouse development. Q. Hu, N. Ueno, and R.R. Behringer. Univ. of Texas M.D. Anderson Cancer Ctr., Houston, TX.

508 B218 Overexpression of *nodal* in mouse embryonic stem cells results in upregulation of endoderm markers. K.C. Pfendler, C.S. Catuar, J.J. Meneses, and R.A. Pedersen. Univ. of California, San Francisco, CA.

509 B219 Foxd3 in patterning the early mouse embryo. L.A. Hanna, D. Zhou, R. Foreman, M. Dottori, M. Goulding, D.S. Kessler, and P.A. Labosky. Univ. of Pennsylvania, Philadelphia, PA; and The Salk Inst., La Jolla, CA.

510 B220 The mouse organizer and its secreted factors Chordin and Noggin are unnecessary for anterior–posterior axis formation but are required for head development. J. Klingensmith, R. Stottmann, A. Nordgren, and R. Anderson. Duke Univ. Med. Ctr., Durham, NC.

511 B221 Two separable elements regulate the expression of mouse Tbx6 in the primitive streak and presomitic mesoderm. E.E. McFadden and D.L. Chapman. Univ. of Pittsburgh, Pittsburgh, PA.

512 B222 Characterization of a novel mouse gene, *cordon-bleu*, expressed in embryonic axial and organizing structures. E.A. Carroll, S. Gasca, and J. Klingensmith. Duke Univ. Med. Ctr., Durham, NC; and Univ. of Freiburg, Freiburg, Germany.

513 B223 Shh is required for cardiac neural crest survival in the mouse. E.N. Meyers, I. Smoak, J. Morris, C. Tan, K. Yamamura, and M. Sullivan. Duke Univ. Med. Ctr., Durham, NC; and Kumamoto Univ. Sch. of Med., Kumamoto, Japan.

514 B224 Function of the *Rx* homeobox gene is essential for the formation of retinal progenitor cells in mice. L. Zhang, P.H. Mathers, and M. Jamrich. Baylor Col. of Med., Houston, TX; and West Virginia Univ. Sch. of Med., Morgantown, WV.

515 B225 Morphological characterization of lung and kidney development: Reprogramming of ureter bud branching with lung mesenchyme toward early lung type branching morphogenesis. Y. Lin, S. Zhang, J. Tuukkanen, H. Peltoketo, T. Pihlajaniemi, and S. Vainio. Univ. of Oulu, Oulu, Finland.

516 B226 Characterization of regulatory elements responsible for Hoxa5 regional expression. L. Jeannotte, J. Lapointe, S. Tabaries, T. Besch, and C.K. Tuggle. Univ. Laval, Quebec, Canada; and Iowa State Univ., Ames, IA.

517 B227 Footless, a new mutant with asymmetric limb malformations. S.M. Bell, C.M. Schreiner, K.P. Anderson, and W.J. Scott. Children's Hosp. Med. Ctr., Cincinnati, OH.

518 B228 HoxD genes regulate muscle and tendon patterning in the limb. P.R. Ashby. Univ. of Dundee, Dundee, Scotland.

519 B229 Activation of FGFr3 regulates development of pillar cells in the mammalian cochlea. K. Mueller and M.W. Kelley. NIDCD/NIH, Rockville, MD.

520 B230 Inhibition of protein kinase C induces supernumerary inner hair cells in the developing mammalian cochlea. A. Dabdoub, M.J. Donohue, and M.W. Kelley. Natl. Inst. on Deafness and other Communication Disorders/NIH, Rockville, MD.

521 B231 Msx and Dlx in feather development. I. Rouzankina, J. Zikherman, and L.A. Niswander. Weill Grad. Sch. of Med. Sci. of Cornell Univ., New York, NY; and Sloan-Kettering Inst., New York, NY.

NIH Workshop

1:30–3:00 PM HUB Ballroom
Zakir Bengali (NIH—Center for Scientific Review)
The NIH Grants Process
3:30–3:45 PM Break

Workshops

4:00–5:30 PM

Workshop 3 — Developmental Biology and Disease Vectors

4:00–5:30 PM — Kane 120

Chair: Laurence Zwiebel

522 4:00 Laurence Zwiebel (Vanderbilt University)
Molecular genetics of olfaction in the malaria vector mosquito Anopheles gambiae

523 4:20 Mohammed Shahabuddin (National Institute of Allergy and Infectious Diseases, NIH)
Drosophila as a model to study the biology of malaria transmission

4:40 Peter Atkinson (UC Riverside)
Gene transfer and expression in mosquitoes

524 5:00 Christopher Bayne (Oregon State University)
Aggression and defense in a trematode–mollusc parasitism

5:20 Discussion

Workshop 4 — Left–Right Asymmetry

4:00–5:30 PM — HUB Ballroom

Chair: Christopher Wright

4:00 Christopher Wright (Vanderbilt University Medical Center)
Major issues in left–right axis determination

525 4:20 Hiroshi Hamada (Osaka University, Japan)
Dissection of a genetic pathway generating left–right asymmetry in the mouse

526 4:40 Martina Brueckner (Yale University)
Mutation of the N-terminus of the left–right dynein (lrd) results in mice with nonrandom reversal of left–right asymmetry

224 5:00 Marnie Halpern (Carnegie Institution of Washington)
Sequential regulation of left/right identity in the zebrafish diencephalon

5:20 Discussion

5:30–7.00 PM — Dinner (McMahon)

Plenary Session II — Cell Fate Determination

7:00–9:00 PM — HUB Ballroom

Chair: David Kimelman

527 7:00 David Kimelman (University of Washington)
Regulation of mesoderm induction and involution in zebrafish

7:30 Chris Doe (University of Oregon)
Cell polarity and asymmetric division of Drosophila neuroblasts

528 8:00 Philip Benfey (New York University)
Radial patterning in Arabidopsis: Signaling inside out

529 8:30 Hans Bode (UC Irvine)
Axial patterning in Hydra

Poster Session II and Mixer Upper
9:00–11:00 PM Husky Den

Odd number boards: Authors present at posters 1:30–3:00 PM
Even number boards: Authors present at posters 9:00–10:30 PM

SATURDAY—July 21

Meeting Registration
8:00 AM–5 PM Kane Lobby

Biotech/Imaging Tutorials
8:00–9 AM TBA

Plenary Session III Color Patterns
9:00–11:15 AM HUB Ballroom

Chair: Sean Carroll

530 9:00 Sean Carroll (University Wisconsin–Madison)
The development and evolution of pigmentation patterns in Drosophila

531 9:30 Stephen Johnson (Washington University)
How the zebrafish gets its stripes

532 10:00 Greg Barsh (Stanford University)
Genetic and molecular basis of mammalian pigmentation patterns

10:30 Break

533 10:45 Vivian Irish (Yale University)
Molecular mechanisms controlling floral pattern

E. G. Conklin Medal Lecture
11:15–12:15 PM HUB Ballroom

11:15 Sean Carroll
Introduction

534 11:25 Sir John Gurdon (University of Cambridge, UK)
From clones to morphogens: The determination of cell fate

12:30–1:30 PM Lunch (McMahon)

Concurrent Symposia
1:30–5:00 PM (15-min coffee break around 3:15 PM)

Symposium 7 Programming and Reprogramming Differentiation
1:30–5:00 PM Kane 110

Chair: Austin Smith

535 1:30 Alejandro Sanchez-Alvarado (Carnegie Institution of Washington)
Maintenance and regeneration of form and function in the planarian Schmidtea mediterranea

536 2:00 Noel Murcia (Case Western Reserve University)
Polaris, the protein product of the Oak Ridge polycystic kidney disease gene, is required for ventral node cell differentiation and node-to-notochord cell-fate transition

537 2:15 Austin Smith (University of Edinburgh, Scotland)
Self-renewal and differentiation of pluripotent embryonic stem cells

538 2:45 Brenda Kahan (University of Wisconsin-Madison)
Progenitors and differentiated progeny of pancreatic islet lineages derived by in vitro differentiation of embryonic stem (ES) cells

539 3:00 Heping Liu (Baylor College of Medicine)
The Mrx.1 gene is required for development of the early mouse embryo

3:15 Break

540 3:45 Sean J. Morrison (University of Michigan)
Neural crest stem cells and peripheral nervous system development

541 4:15 Enrique Amaya (University of Cambridge, U.K.)
Xenopus Sprouty2 inhibits FGF-mediated gastrulation movements but does not affect mesoderm induction and patterning

542 4:30 Peter Mombaerts (Rockefeller University)
Cloning mice by nuclear transfer

Symposium 8 Diversity of Form

1:30–5:00 PM Kane 120

Chair: Billie Swalla

543 1:30 Richard Behringer (MD Anderson)
Bat molecular embryology: Comparative studies of mammalian limb development

544 2:00 Scott Gilbert (Swarthmore College)
Development of the turtle shell: Osteogenesis of an evolutionary novel structure

545 2:15 Katie Peichel (Stanford University)
The genetic basis of morphological evolution in the threespine stickleback (Gasterosteus aculeatus)

546 2:45 Judith Croxdale (University of Wisconsin–Madison)
Trichome genes affect stomatal pattern

547 3:00 Patricia Wittkopp (University of Wisconsin–Madison)
The role of yellow in the evolution of pigmentation patterns in the genus Drosophila

3:15 Break

548 3:45 Margaret McFall-Ngai (University Hawaii–Manoa)
The influences of bacteria on postembryonic animal development

549 4:15 Brad Davidson (University of Washington)
A developmental role for the immune system in Urochordate metamorphosis: molecular and morphological investigations of ascidian metamorphogenesis reveal elements of an innate immune response

550 4:30 Billie Swalla (University of Washington)
New perspectives of the origin of the Chordates

Symposium 9 Developmental Biology and Medicine

1:30–5:00 PM Kane 120

Chair: Leonard Zon

551 1:30 Marc Tessier-Lavigne (UC San Francisco)
The logic and mechanisms of axon guidance

552 2:00 Han Wang (University of Oregon)
Circadian expression of clock, bmal1, and per1 during zebrafish embryogenesis

553 2:15 Leonard Zon (Children's Hospital, Boston)
Screens in zebrafish for genes related to the cell cycle and cancer

554 2:45 Sally Dunwoodie (Victor Chang Cardiac Research Institute)
Delta3 mutational analysis in mouse defines the developmental origins of skeletal dysplasia in spondylocostal dysostosis

555 3:00 Beth Roman (National Institute of Child Health and Human Development, NIH)
The zebrafish mutant violet beauregarde exhibits abnormal cranial blood vessel development due to a lesion in alk1, the gene responsible for human hereditary hemorrhagic telangiectasia type II

3:15 Break

3:45 George Yancopoulos (Regeneron)
Helping orphan receptors find their growth factors: Tales of neurons, muscle, cartilage, blood vessels, and obesity

556 4:15 Margaret Baron (Mount Sinai School of Medicine)
Activation of hematopoiesis and vasculogenesis by hedgehog signaling in the mouse embryo

4:30 Eric Olson (UT Southwestern)
Transcriptional control of cardiac form and function

Reception, Banquet, and Awards Presentation

Lifetime Achievement Award

Anne McLaren (University of Cambridge, UK)

Poster Competition Awards

TBA

Entertainment

6 PM Bambaji HUB Ballroom

SUNDAY—July 22 ***Departure***

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